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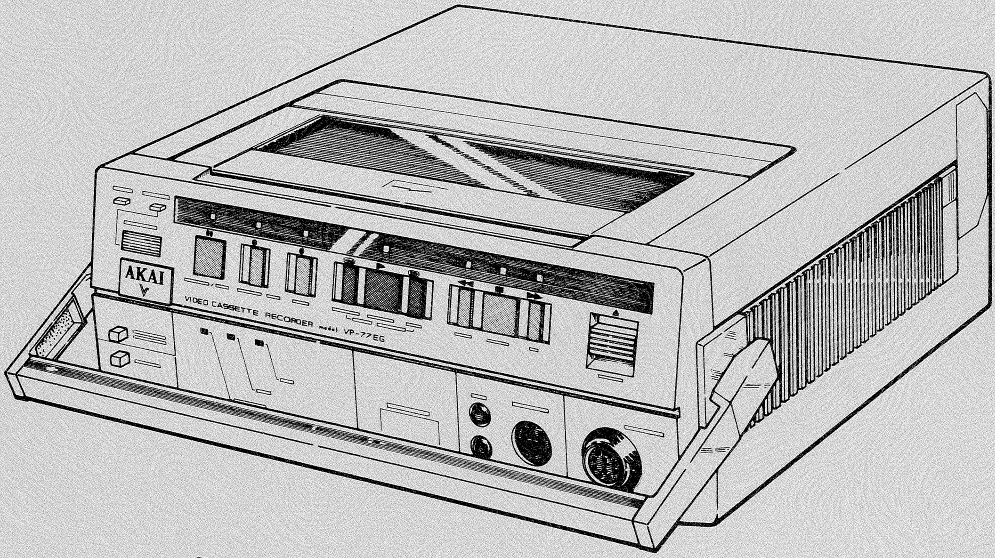
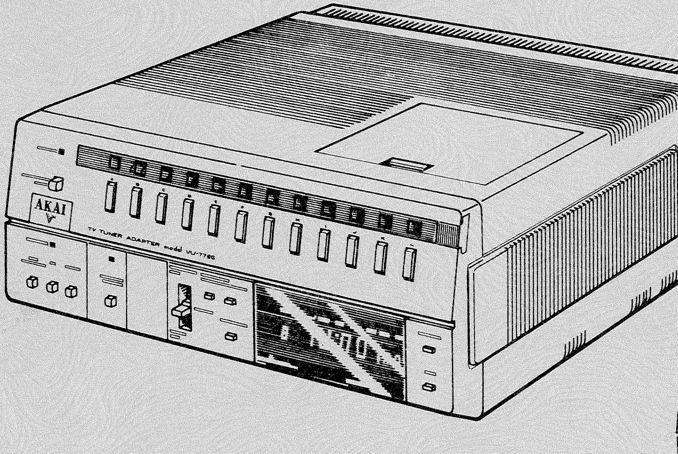
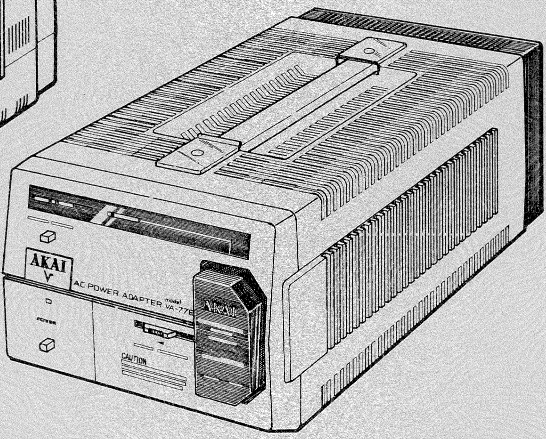
AKAI SERVICE MANUAL


AKAI
VIDEO CASSETTE RECORDER model VP-77EG


AKAI
TV TUNER ADAPTER model VU-77EG


AKAI
AC POWER ADAPTER model VA-77EG
POWER
CAUTION
AKAI

VIDEO CASSETTE RECORDER

MODEL VP-77EG/EK/S

TV TUNER ADAPTER

MODEL VU-77EG/EK/S

AC POWER ADAPTER

MODEL VA-77EG/EK/S

RESET
MEMORY
COUNTER
AKAI
PAUSE/STILL
SOUND DUB.
REC
REVIEW
PLAY
CUE
QUICK FINDER
REW
STOP
FF
EJECT
VIDEO CASSETTE RECORDER
model VP-77EG
REC LOCK
POWER
TAPE RUN
BATT
DEW
TRACKING
NORMAL
SLOW
MIC
PHONE
REMOTE
CAMERA
VHS

VIDEO CASSETTE RECORDER

MODEL VP-77EG/EK/S

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SECTION 2 MECHANISM DESCRIPTION
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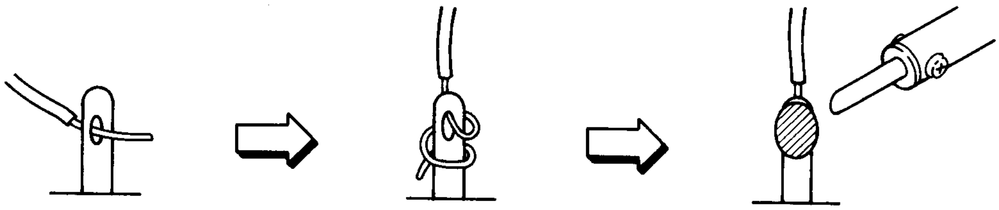
SAFETY INSTRUCTIONS

SAFETY CHECK AFTER SERVICING

Confirm the specified insulation resistance between power cord plug prongs and externally exposed parts of the set is greater than 10 Mohms, but for equipment with external antenna terminals (tuner, receiver, etc.) and is intended for $\boxed{C}$ or $\boxed{A}$, specified insulation resistance should be more than 2.2 Mohms (ground terminals, microphone jacks, headphone jacks. line-in-out jacks etc.)

PRECAUTIONS DURING SERVICING

1. Parts identified by the ⚠ symbol parts are critical for safety.
   Replace only with parts number specified.
2. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation. These must also be replaced only with specified replacements.
   Examples: RF converters, tuner units, antenna selector switches, RF cables, noise blocking capacitors, noise blocking filters, etc.
3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads
4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers (Insulating Barriers)
   4) Insulation sheets for transistors
5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.



6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).
7. Check that replaced wires do not contact sharp edged or pointed parts.
8. Also check areas surrounding repaired locations.
9. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

SECTION 1

GENERAL DESCRIPTION

This manual provides service information for the AKAI VHS Model VP-77EG/EK/S.
The manual describes the principles and adjustments of mechanical and electrical operations for this model.
Service procedures given herein cover only field maintenance services.
Adjustments which require high-level instruments, jigs and techniques are excluded, since they should be performed at the factory.
Due to design modifications, the servicing procedures and data given in this manual are subject to possible change without prior notice.

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Thank you for purchasing the AKAI VP-77EG/EK/S Portable Colour Video Cassette Recorder. Based on the VHS video format developed by JVC for full home-video entertainment, this unit has been designed with emphasis on its ease of operation, mobility and ruggedness as a handy portable.
Using this unit in combination with a AKAI colour video camera, you can make your own video tapes in a wide variety of situations, outdoors and indoors.
To obtain the best performance and greatest utilization from your VP-77EG/EK/S, read this instruction booklet completely and carefully.

VHS PAL   VHS SECAM

Only cassettes marked "VHS" can be used with this video cassette recorder.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

This unit should be used with 12 V DC only.

CAUTION:
To prevent electric shocks and fire hazards, do NOT use any other power source.

CAUTION:
To prevent shock, do not open the cabinet. No user serviceable parts inside. Refer servicing to qualified personnel.

The EK-version is for use in the United Kingdom.

WARNING (For EG-version)

1. This set is for exclusive use with the PAL colour system.
   Connect a video camera built to the PAL standard.
2. SECAM colour programmes might be recorded in certain areas when this set is used in combination with a tuner unit but there is no interchangeability of these recorded cassette tapes with other PAL-VHS recorders or SECAM-VHS recorders.
3. Please use the exclusive SECAM-VHS recorder in SECAM broadcasting areas.
4. Please use only PAL prerecorded cassette tapes of PAL signals which have been recorded with the PAL-VHS system.

NOTE:
The rating plate (Serial Number Plate) is on the bottom bottom of the unit.

IMPORTANT:
It is permissible to record television programmes only in the event that third party copyrights and other rights are not violated.

WARNING (The United Kingdom)
Recording and playback of material may require consent. See copyright Act 1956 and Performers Protection Act 1958 – 1972.

1-1. FEATURES .

- Extremely compact and lightweight, easy-to-use portable recorder built to the VHS format.
- Flexible three-way power supply arrangement – exclusive Ni-Cd rechargeable battery pack, house-hold AC and car battery.
- Feather-light touch pushbutton operation due to microprocessor-based full-logic tape control.
- Full 12-mode remote control operation.
- Newly-developed slow-motion mechanism for producing clean slow-motion pictures.
- Quick finder for quick picture search in both directions at a speed about 10 times the normal.
- ESC (Edit Start Control) system minimizing picture distortion between separately recorded segments.
- Audio dubbing facility provided to record sound track on pre-recorded tapes.
- May be connected to most TV receivers due to the built-in RF converter.
- Tape running indicator for easy visual check of the tape running condition.
- LCD (Liquid Crystal Display) tape counter with memory function.
- Recording standby mode lock switch provided.

1-2. SPECIFICATIONS

GENERAL

POWER REQUIREMENT		12 V ⎓ DC
POWER CONSUMPTION		9.6 watts
WEIGHT		5.2 kg including battery pack 4.4 kg without battery pack
DIMENSIONS		28.8(W) x 10.3(H) x 26.8(D) cm
TEMPERATURE	OPERATING	0° to 40°C
	STORAGE	–20° to 60°C

TAPE SECTION

FORMAT		VHS PAL Standard (EG/EK) VHS SECAM Standard (S)
VIDEO SIGNAL SYSTEM		PAL-type colour and monochrome CCIR signal, 625 lines (EG/EK) SECAM-type colour and monochrome CCIR signal, 625 lines (S)
VIDEO RECORDING SYSTEM		Rotary, slant azimuth, two-head helical scanning system
TAPE WIDTH		12.7 mm
TAPE SPEED		23.39 mm/sec.
MAXIMUM RECORDING TIME		180 min. (with AKAI E-180 cassette)
REWIND AND FAST FORWARD TIME		Within 5 minutes (with AKAI E-180 cassette)
VIDEO SIGNAL	INPUT	0.5 to 2.0 Vp-p, 75 ohms unbalanced
	OUTPUT	1.0 Vp-p, 75 ohms unbalanced
	HORIZONTAL RESOLUTION	More than 240 lines (colour mode)
	SIGNAL TO NOISE RATIO	More than 43 dB (Rohde & Schwarz noise meter)
AUDIO SIGNAL		
	MICROPHONE INPUT	–67 dBs, high impedance, unbalanced
	LINE INPUT	–20 dBs, 50 k-ohms, unbalanced
	LINE OUTPUT	–6 dBs, less than 1 k-ohm, unbalanced
	EARPHONE OUTPUT	0 dBs, 100 ohms, unbalanced
	FREQUENCY RESPONSE	100 to 8,000 Hz
	SIGNAL TO NOISE RATIO	More than 40 dB

RF SECTION

RF OUTPUT CHANNEL	UHF channels 32 – 40
OUTPUT IMPEDANCE	75 ohms unbalanced

ACCESSORIES

PROVIDED	Remote control unit, aerial cable, shoulder strap, carrying handle, earphone BP-N 77 Battery pack
OPTIONAL	VG-V77 Carrying bag SC-V77 Shoulder cart VW-3 Car battery cord

Design and specifications subject to change without notice.

1-3. PRECAUTIONS

Handling and storage

- Prevent inflammables, water and metallic objects from entering the unit.
- Do not disassemble or remodel the unit, as this will cause danger and malfunctioning.
- Do not use the unit when it is lightening in the vicinity and exercise special care not to allow the unit to become wet when shooting outdoors on rainy days.
- Do not place heavy objects on the unit.
- Do not apply shocks to the unit.
- Do not subject the unit to direct sunlight or place it near a heater for a long period of time, otherwise the cabinet may become deformed or the internal electronic components such as transistors may be damaged. Pay special attention of rising temperature in closed cars on hot summer days; the temperature in closed cars sometimes reaches as high as 80°C.
- Avoid using the unit under the following conditions:
  - Extremely hot or cold places
  - Near appliances generating strong magnetic fields
  - Moving from a cold to a warm place
  - Places subject to excessive humidity, dust or vibrations

AKAI
Sefety tab

Video cassettes

- The VP-77EG/EK employs VHS type cassettes only; E-180 for 3 hours, E-120 for 2 hours, E-60 for 1 hour and E-30 for 30 minutes of recording.
- Video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has been removed, use adhesive tape to block the hole.
- Do not load and unload a video cassette successively without allowing the tape to run. This may slacken or damage the tape.
- An inverted cassette cannot be inserted.
- Do not touch the tape directly.
- Do not disassemble the video cassettes.
- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or a magnet) and dusty places.
- Place the cassettes in cassette cases and position them vertically.

Operation

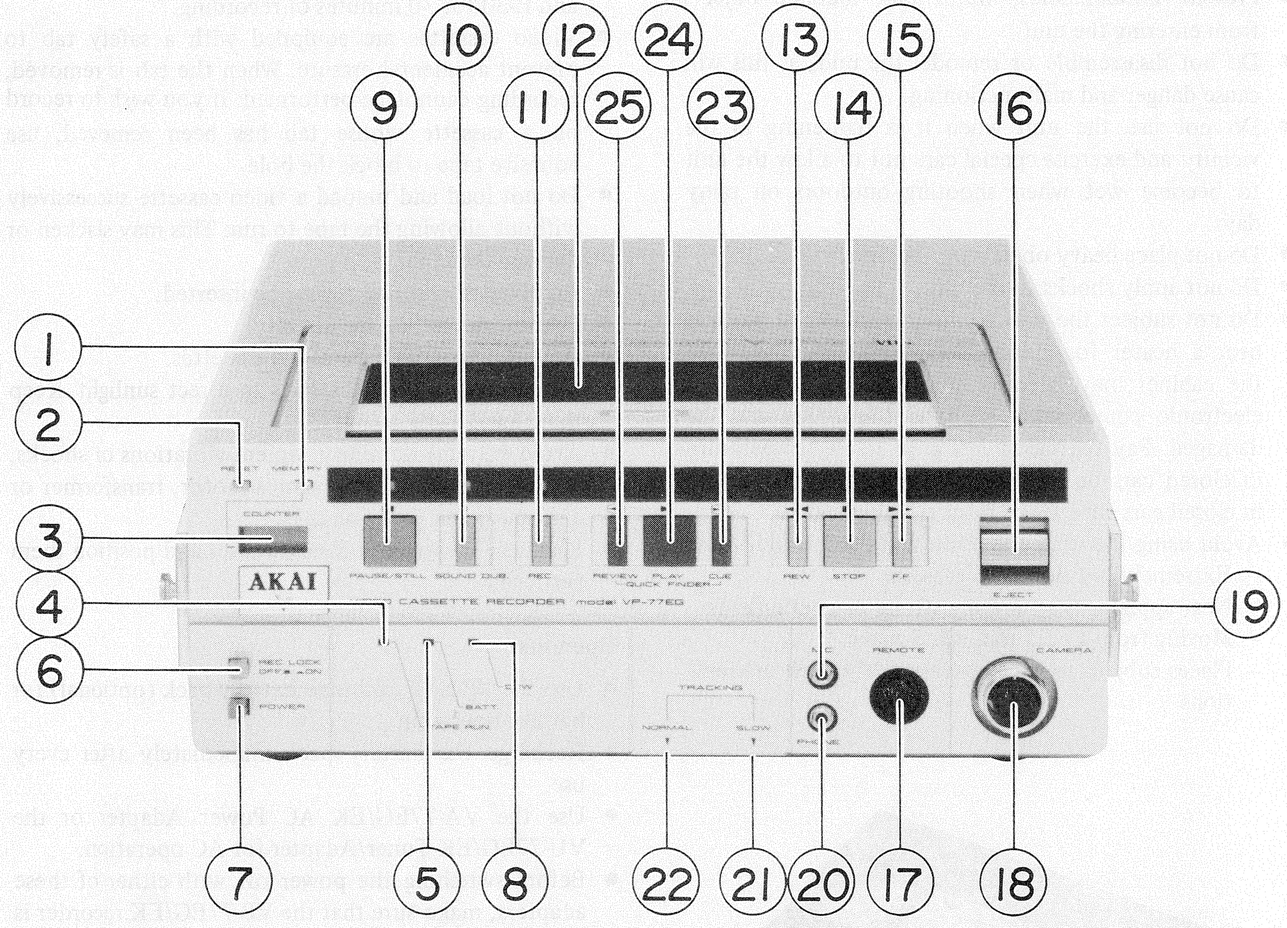
- Use the BP-N77 exclusive battery pack (optional) for battery operation.
- Recharge the battery pack immediately after every use.
- Use the VA-77EG/EK AC Power Adapter or the VU-77EG/EK Tuner/Adapter for AC operation.
- Before switching the power off with either of these adapters, make sure that the VP-77EG/EK recorder is in the Stop mode.

Maintenance

- Do not use thinner or benzine to clean the cabinet; use a piece of soft cloth. If it becomes excessively dirty, wipe with a cloth soaked in a neutral cleaner diluted with water and then with a dry cloth.

If malfunctioning occurs, stop using the unit immediately and consult your local AKAI dealer.

1-4. CONTROLS AND CONNECTORS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VIDEO CASSETTE RECORDER model VP-77EG
REC LOCK
OFF ON
POWER
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TAPE RUN
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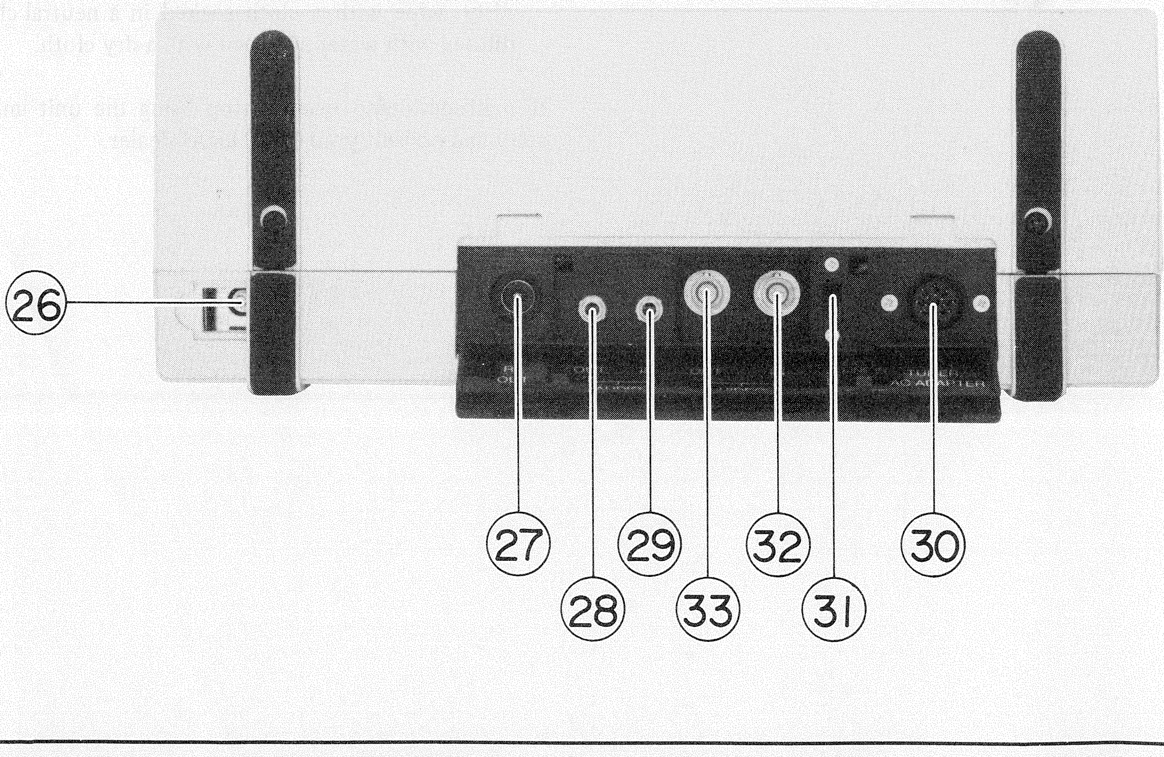
SLOW
MIC
PHONE
REMOTE
CAMERA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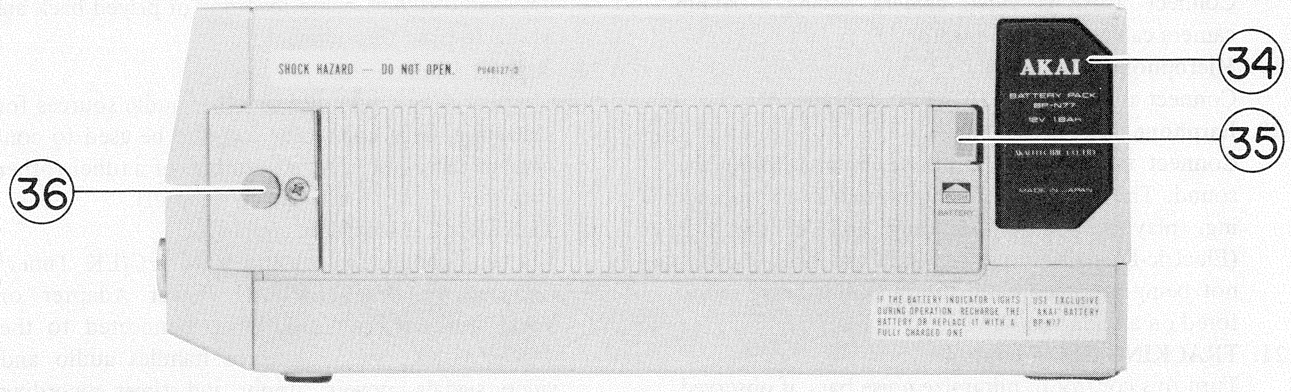
TUNER/AC ADAPTER



1. **MEMORY button**
   For automatic tape indexing in conjunction with the tape counter. When this button is pressed, "M" appears at the bottom left-hand corner of the tape counter display. In this state, the tape will stop automatically in the Rewind and Fast Forward modes at the counter reading of "0". At the same time, the Memory mode is automatically released with the indication "M" disappearing.
2. **Counter RESET button**
   Press to reset the tape counter to "0".
3. **Tape COUNTER**
   Displays from "–1999" to "+1999" as the tape runs.
4. **Tape running indicator (TAPE RUN)**
   Flashes in synchronism with the take-up reel speed.
5. **Battery power warning indicator (BATT)**
   Lights red to warn of insufficient battery power.
6. **Recording standby mode lock button (REC LOCK)**
   This button is used together with the POWER button to save battery power while at the same time maintaining the Recording Standby mode so that smooth assembled recordings can be made.
7. **POWER button**
   Press to turn the power ON (▬). Press again to turn the power OFF (■). Either in battery or AC operation, pressing this button in starts consuming power. Especially in battery in battery operation, be sure to press this button to OFF whenever the recorder is not in use.
8. **Moisture condensation indicator (DEW)**
   As long as this indicator lights red, the recorder ceases to function in order to protect the video head and tape from damage.
9. **PAUSE/STILL button**
   Press to stop the tape temporarily. During recording, press this button to avoid recording unwanted material. During playback, press this button to view a still picture.
10. **AUDIO DUB button**
    Press together with the PLAY button to record audio on a pre-recorded tape.
11. **Record button (REC)**
    Press together with the PLAY button for video and audio recording.
12. **Cassette housing**
    When the EJECT button is pressed, the cassette housing lifts gently.
    - When removing the cassette, make sure that the recorder is in the Stop mode. Then press the EJECT button.
13. **Rewind button (REW)**
    Press to rewind the tape. The REW button can be pressed directly from any mode except the Record and Audio Dub modes.
14. **STOP button**
    Press to stop the tape. When the STOP button is pressed, the tape is unloaded from around the tape transport mechanism and stops inside the cassette. This is referred to as the Stop mode. The LED indicator above the STOP button remains lighted in the Stop mode.
15. **Fast forward button (FF)**
    Press to fast forward the tape. The FF button can be pressed directly from any mode except the Record and Audio Dub modes.
16. **EJECT button**
    Press to lift the cassette housing.
17. **REMOTE control connector**
    Connect the provided remote control unit to this terminal.

18. **CAMERA connector**
Connect a AKAI video camera having a 10-pin camera cable to this connector.

19. **Microphone jack (MIC)**
Connect a microphone for audio dubbing.

20. **Earphone jack (EAR)**
Connect the provided earphone for monitoring the sound. The sound can be monitored during recording, playback, audio dubbing and in the E-E (Electric-Electric) mode in which the input signal is not being recorded onto the tape, but being monitored on a connected TV.

21. **TRACKING SLOW control**
Turn this control to minimize noise bars, if observed during slow-motion or still-frame playback.

22. **TRACKING NORMAL control**
Turn this control to minimize noise bars, if observed during normal-speed playback.

23. **QUICK FINDER CUE button**
This button enables high-speed playback (video only) in the forward direction only while it is being pressed.

24. **PLAY button**
Press to play back the tape. Also press this button together with the REC button for recording or with the AUDIO DUB button for audio dubbing. The PLAY button should be pressed first for obtaining any playback mode.

25. **QUICK FINDER REVIEW button**
This button enables high-speed playback (video only) in the reverse direction only while it is being pressed.

26. **RF converter channel adjustment screw**
For selecting between UHF channels 32 and 40 depending on the vacant channel for the RF output.

27. **RF OUT connector**
The output of the built-in RF converter is available from this connector. Connect to the UHF antenna terminal of a TV receiver for viewing video programmes on the TV screen.

28. **AUDIO OUT connector**
The audio signals being recorded or played back are available from this connector.

29. **AUDIO IN connector**
Connect a tape recorder or other audio sources for recording. This connector can also be used to connect to the audio output terminal of a tuner (other than the VU-77EG/EK Tuner/Adapter).

30. **TUNER/AC ADAPTER connector**
For the connection of the VU-77EG/EK Tuner/Adapter, VA-77EG/EK AC Power Adapter or VW-3 Car Battery Cord. When connected to the VU-77EG/EK, this connector handles audio and video signals, power supply and timer recording trigger signal. When connected to the VA-77EG/EK or VW-3, it functions only as a power input connector.

31. **EXT LINE IN/TUNER select switch**
Set to TUNER when recording off-air TV programmes using the VU-77EG/EK Tuner/Adapter. Set to EXT LINE IN when recording sources connected to the VIDEO IN and AUDIO IN connectors.
For camera recording using a camera connected to the front panel CAMERA connector, this switch may be set to either position.

32. **VIDEO IN connector**
Connect a video signal source other than that from a AKAI video camera. This connector can also be used to connect to the video output terminal of a tuner (other than the VU-77EG/EK Tuner/Adapter).

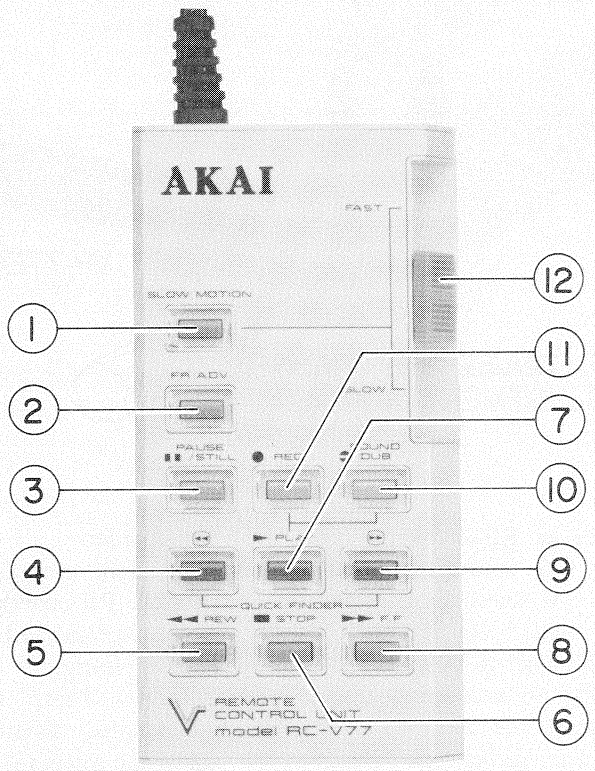
33. **VIDEO OUT connector**
The video signals being recorded or played back are available from this connector.

34. **Battery compartment**
Install the exclusive BP-N77 battery pack.

35. **BATTERY eject button**
Press this button to remove the battery.

36. **SHOULDER strap/carrying handle retainer**
Attach either the shoulder strap or the carrying handle (provided).

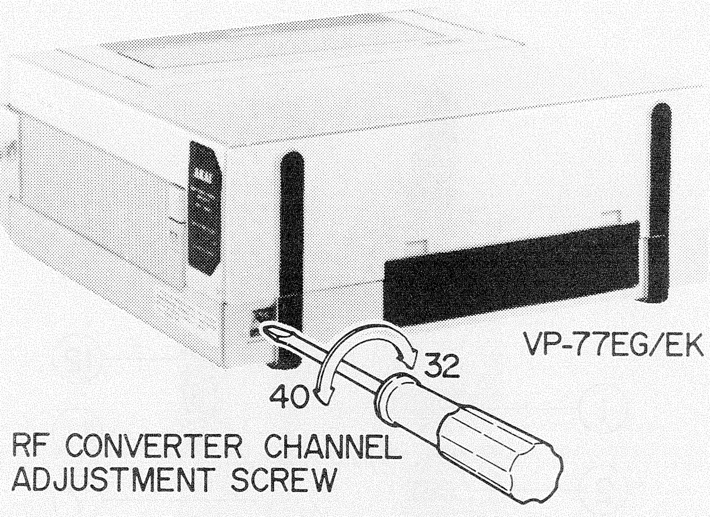
1-5. REMOTE CONTROL UNIT



The provided full-function remote control unit allows operation of the VP-77EG/EK from a distance. All tape control buttons are duplicated on the remote control unit, which has some additional tape control capabilities such as slow-motion playback at variable speeds and single-frame advance.

1. **SLOW MOTION button**
   Press to view slow-motion playback.
2. **Frame advance button (FR ADV)**
   Press to view the playback picture frame by frame. When this button is pressed once in the Still mode, the picture is advanced by one frame. Keeping this button pressed, the picture is advanced by one frame per second.
3. **PAUSE/STILL button**
   Same as the PAUSE/STILL button on the recorder.
4. **QUICK FINDER REVIEW button**
   Same as the QUICK FINDER REVIEW button on the recorder.
5. **REW button**
   Same as the REW button on the recorder.
6. **STOP button**
   Same as the STOP button on the recorder.
7. **PLAY button**
   Same as the PLAY button on the recorder.
8. **FF button**
   Same as the FF button on the recorder.
9. **QUICK FINDER CUE button**
   Same as the QUICK FINDER CUE button on the recorder.
10. **AUDIO DUB button**
    Same as the AUDIO DUB button on the recorder.
11. **REC button**
    Same as the REC button on the recorder.
12. **SLOW MOTION speed control knob (FAST/SLOW)**
    After engaging the Slow-motion mode, adjust the speed by sliding this knob to meet your specific needs; toward FAST for faster speeds and toward SLOW for slower speeds.

1-6. RF CONVERTER ADJUSTMENT

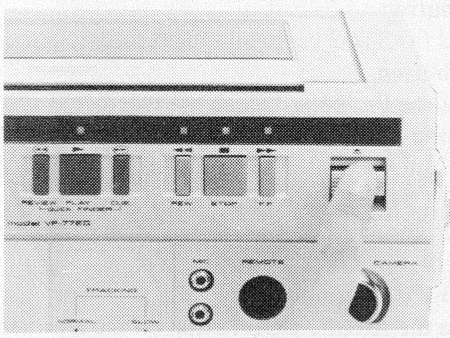


The VP-77EG/EK incorporates an RF converter for playback using a TV receiver. The output of the RF converter can be seen on the TV screen on a vacant channel which is not used for public broadcasting. The RF converter in this unit has been set to UHF channel 36 before shipment. If channel 36 is employed for broadcasting in your area, reset the RF converter channel to one of the vacant channels between 32 and 40 as follows:

1. Adjust the TV receiver channel to one of the vacant channels.
2. Connect a video camera and switch the power on for the recorder.
3. While monitoring the camera signal on the TV screen, turn the RF converter channel adjustment screw in either direction so that the monitored picture comes in most clearly.

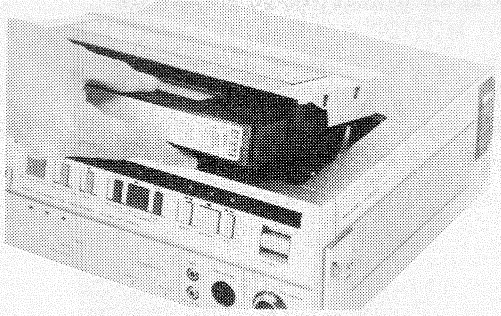
- Converter channel resetting is also possible using a pre-recorded cassette. Play back the cassette and adjust the screw to obtain the clearest picture on the TV screen.
- When you wish to view video cassette programmes, always set the TV receiver's channel selector to your VIDEO CHANNEL.

1-7. LOADING AND UNLOADING THE VIDEO CASSETTE

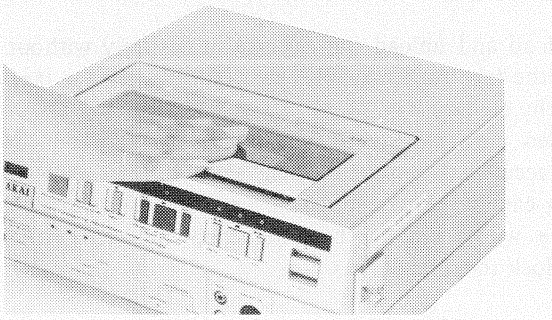


Loading

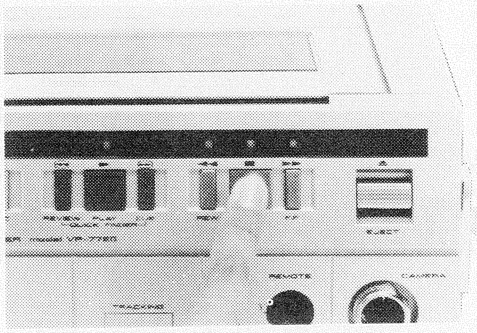
1. Press the EJECT button.
   The cassette housing will lift gently.



2. Insert a cassette fully and correctly.
   - An inverted cassette cannot be inserted.

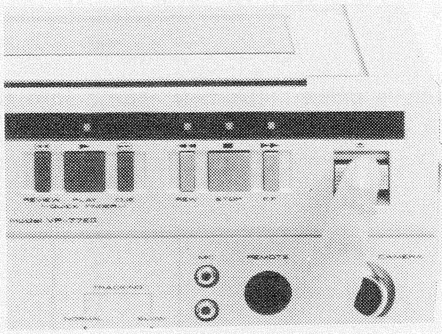


3. Press the cassette housing down to lock in place.
   - Be careful not to press the cassette housing with a cassette inserted midway.

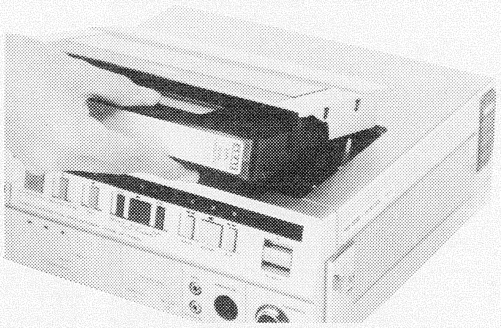


Unloading

1. Make sure that the recorder is in the Stop mode.



2. Press the EJECT button.



3. Remove the cassette.

4. Press the cassette housing down until it locks.

if the EJECT button cannot be pressed in . . .

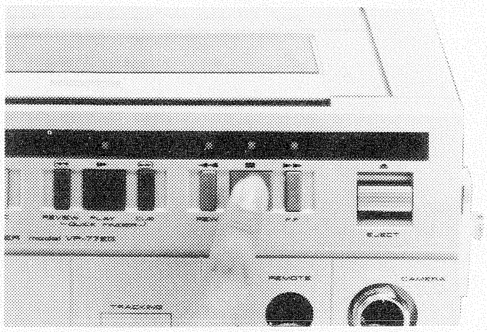
The tape is loaded around the tape transport mechanism and, therefore, the cassette housing is prevented from lifting up. Press the POWER button to ON and press the STOP button to return the tape into the cassette. Then the EJECT button becomes operative.

NOTES:

- Do not load and unload the cassette successively without allowing the tape to run at all. This would slacken the tape and thereby damage it.
- VHS video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has been removed, use cellophane tape to block the slot.

1-8. BASIC OPERATIONS

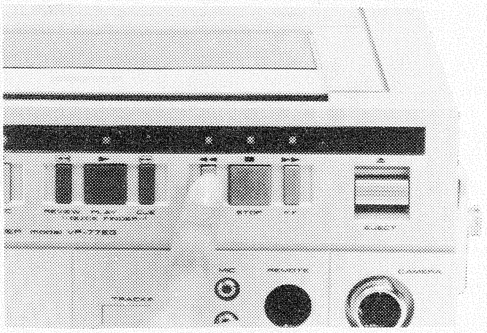
When operating this unit, first press the POWER button to ON (▬).



STOP button

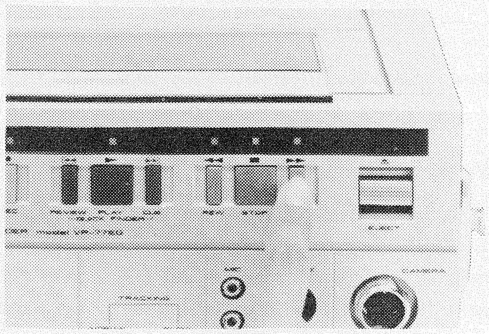
When the STOP button is pressed, the tape returns into the cassette and stops. (This is referred to as the Stop mode.)

- The STOP button has priority over all other operational modes.



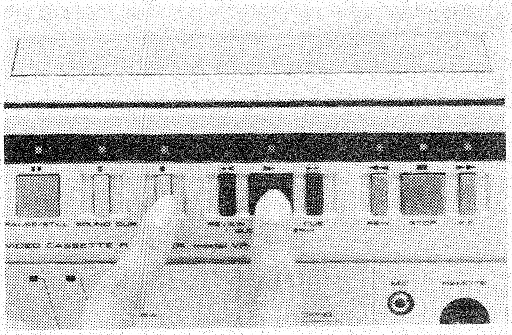
REW button

Press this button to rewind the tape.



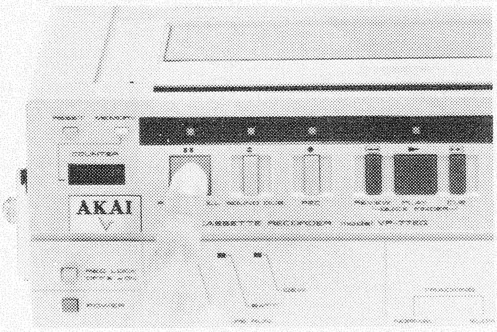
FF button

Press this buttton to fast forward the tape.



REC button

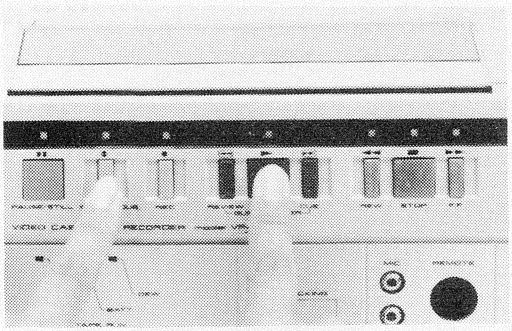
Press this button simultaneously with the PLAY button to start recording.



PAUSE/STILL button

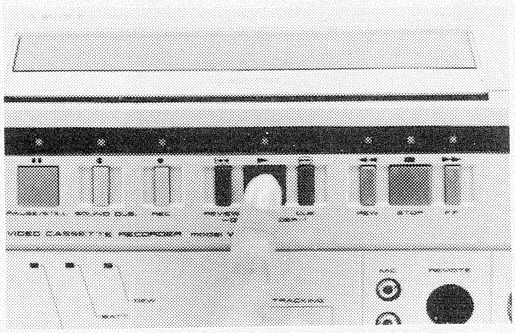
Press this button to stop the tape temporarily.

- When this button is pressed during recording, the input signal is seen on the TV screen, but recording does not take place.
- When this button is pressed during playback, a still picture can be obtained.
- To release the Pause or Still mode, press the PLAY button.



AUDIO DUB button

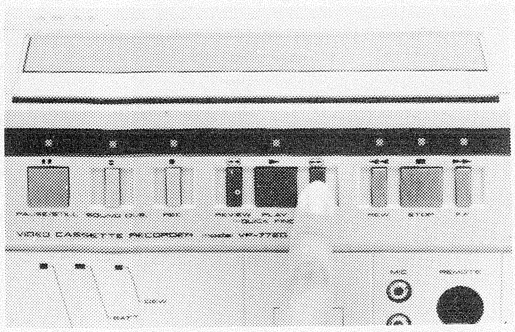
Press this button simultaneously with the PLAY button to record sound on pre-recorded tapes.



PLAY button

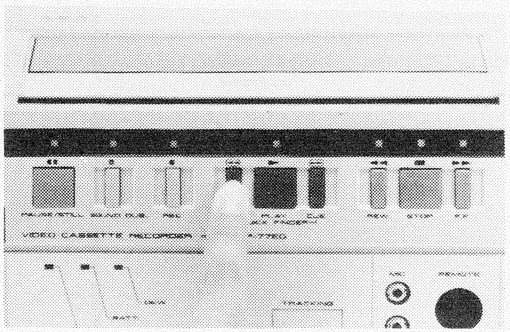
Press this button to playback pre-recorded cassettes.

- Press this button simultaneously with the REC button for recording or with the AUDIO DUB button for audio dubbing.



QUICK FINDER CUE button

When this button is pressed during playback, playback speed is accelerated to about 10 times normal.



QUICK FINDER REVIEW button

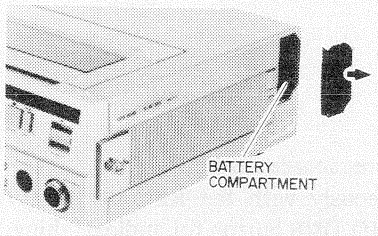
When this button is pressed during playback, reverse playback takes place at a speed about 10 times normal.

1-9. POWER SUPPLY

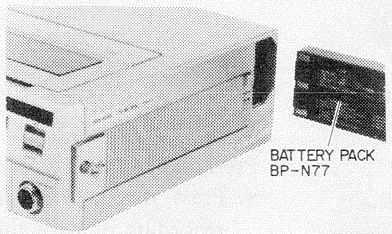
The VP-77EG/EK employs a convenient three-way power supply system. Select household AC current, BP-N77 exclusive battery pack or car battery according to your specific situation.

Using the exclusive BP-N77 battery pack (optional)

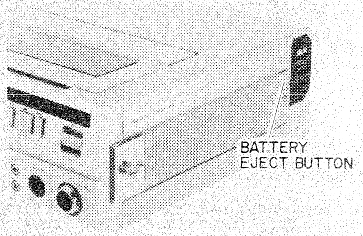
Use the exclusive BP-N77 battery pack when you operate the VP-77EG/EK outdoors in combination with a video camera.



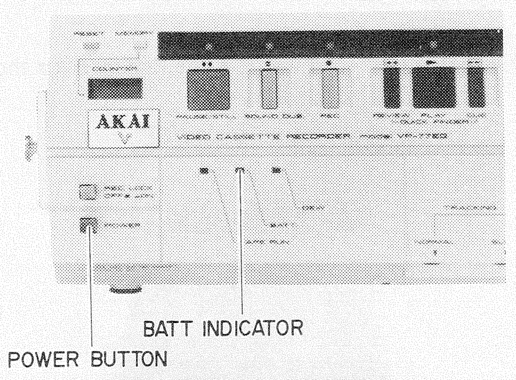
1. Remove the battery compartment cover.
- After installing the battery pack, do not use the battery compartment cover.



2. Insert a battery pack into the compartment. When it is fully inserted, it locks automatically and electrical connection is made.



3. To unload the battery pack, push the BATTERY eject button.

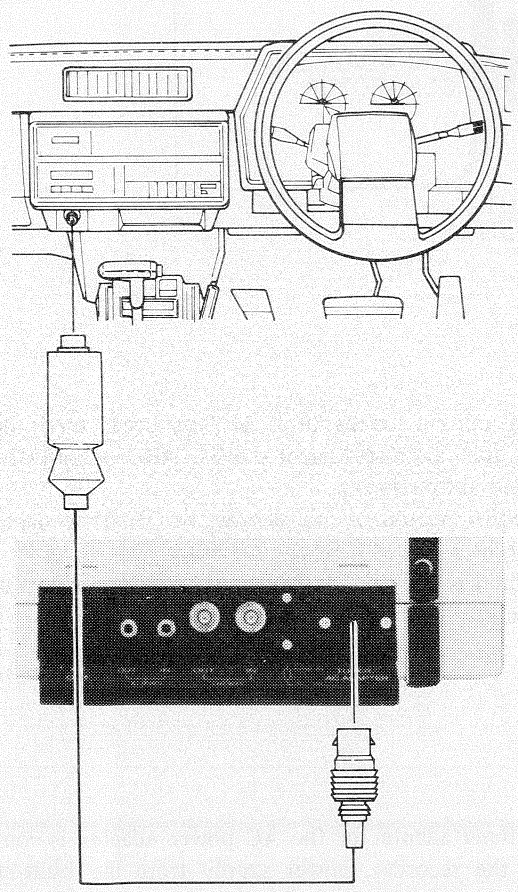


NOTES:

- Prior to inserting a battery pack, be sure to set the POWER button to OFF (■).
- Before use, be sure to recharge the battery pack. For recharging procedures, refer to page 1-17.
- Exercise special care not to allow any foreign matter to enter the battery compartment, otherwise malfunctioning may occur.
- If the BATT indicator on the front panel should light during operation via the battery pack, the battery power is nearing its end. Recharge the battery pack or replace it with a fully charged one.

Using a car battery

When you wish to drive the VP-77EG/EK with a car battery, employ the VW-3 Car Battery Cord (optional).



1. Plug one end of the car battery cord into the car's cigarette lighter socket.
   - Prior to connecting, be sure to set the POWER button to OFF (■).
2. Plug the other end of the cord into the recorder's TUNER/AC ADAPTER connector.

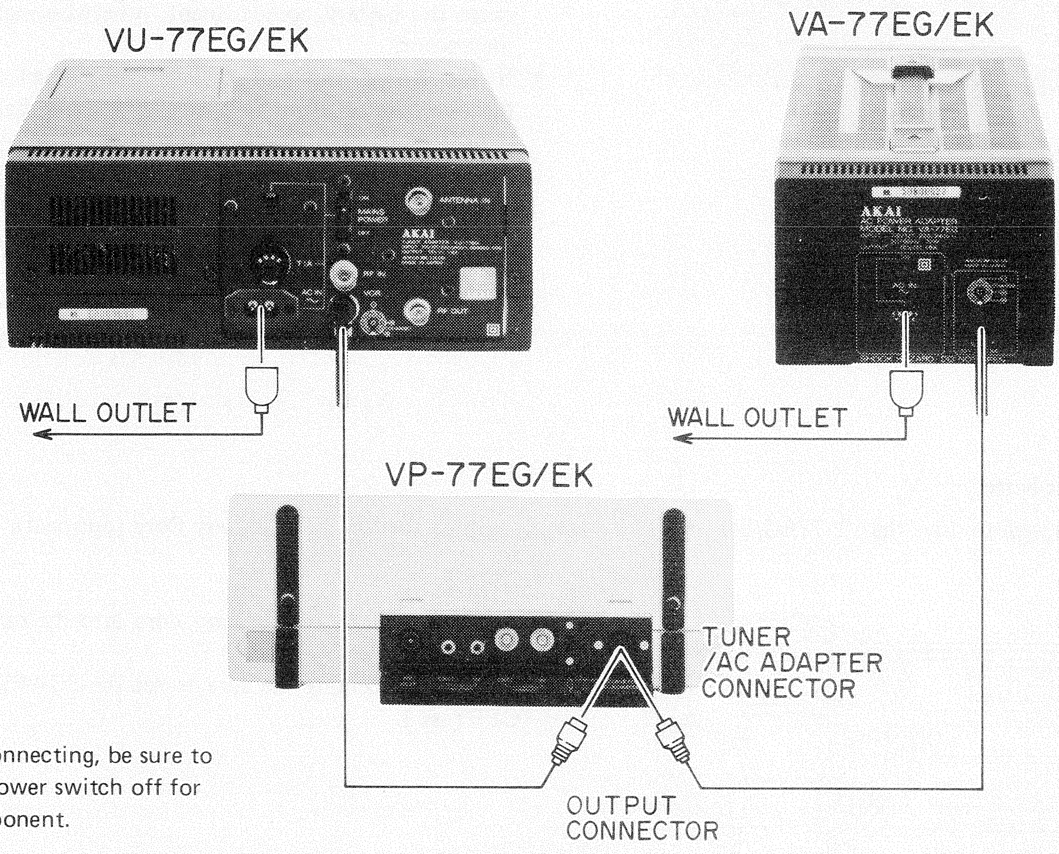
NOTES:

- To stop power supply, be sure to put the recorder in the Stop mode first. Then unplug the cord.
- Use the car battery with the engine idling or while driving the car in order to avoid discharging the car battery.
- The VW-3 car battery cord is exclusively for 12-volt NEGATIVE-GROUNDED car batteries. It cannot be connected to cars having positive-grounded batteries.
- When the car battery cord is connected to the recorder, power supply from the built-in battery pack is automatically switched off.

Using household AC

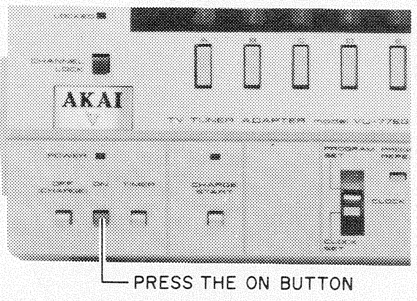
If you wish to power the VP-77EG/EK from an AC outlet, employ either the VU-77EG/EK Tuner/Adapter or the VA-77EG/EK AC Power Adapter.

Connection


VU-77EG/EK
VA-77EG/EK
WALL OUTLET
WALL OUTLET
VP-77EG/EK
TUNER /AC ADAPTER CONNECTOR
OUTPUT CONNECTOR

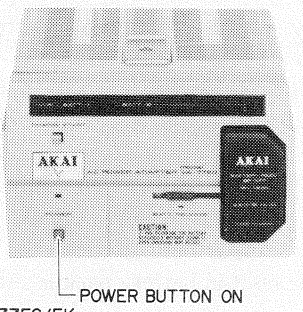
Prior to connecting, be sure to turn the power switch off for each component.

Operation


AKAI
PRESS THE ON BUTTON

VU-77EG/EK

- After making correct connections as illustrated, turn the power on for the tuner/adapter or the AC power adapter by pressing the relevant button.
- Press the POWER button of the recorder to ON. This makes the recorder to be powered from the AC outet.
- Prior to switching the power off, be sure that the recorder is in the Stop mode.


AKAI
AKAI
POWER BUTTON ON

VA-77EG/EK

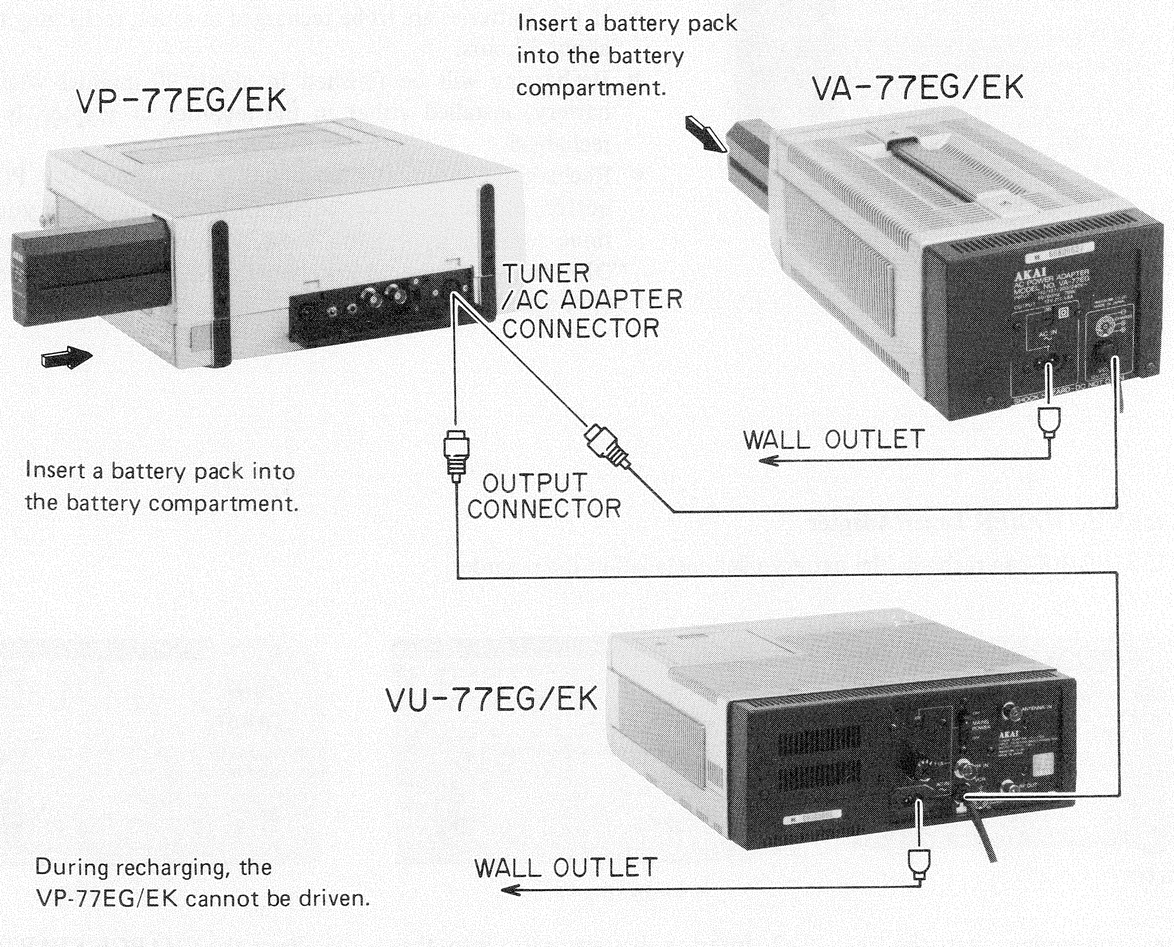
NOTES:

- When the tuner/adapter or the AC power adapter is connected to the recorder, power supply from the built-in battery pack is automatically switched off.
- If a power failure should occur during AC operation, the video cassette cannot be removed unless the recorder is already in the Stop, Rewind or Fast Forward mode. In such cases, wait until power is re-applied.

1-10. RECHARGING THE BP-N77 BATTERY PACK

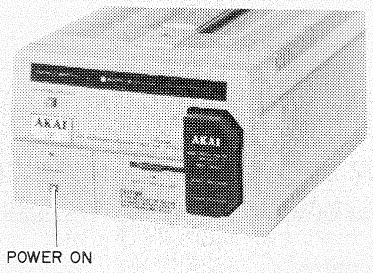
Either the VA-77EG/EK AC Power Adapter or the VU-77EG/EK Tuner/Adapter can be used to recharge the BP-N77 battery pack.

- For more information, refer to the instruction manual relevant to those models.
- Prior to connecting, switch the power off for the VA-77EG/EK or VU-77EG/EK.

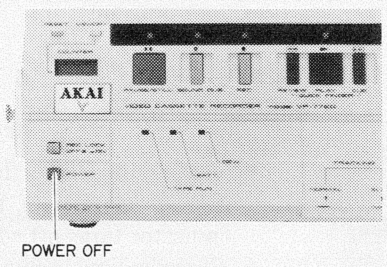

Insert a battery pack
into the battery
compartment.
VP-77EG/EK
VA-77EG/EK
TUNER
/AC ADAPTER
CONNECTOR
WALL OUTLET
Insert a battery pack into
the battery compartment.
OUTPUT
CONNECTOR
VU-77EG/EK
During recharging, the
VP-77EG/EK cannot be driven.
WALL OUTLET

Using the VA-77EG/EK AC Power Adapter

The VA-77EG/EK can recharge two battery packs in series. First the battery pack installed in the VP-77EG/EK is recharged and then, automatically, the battery pack installed in the adapter is recharged.

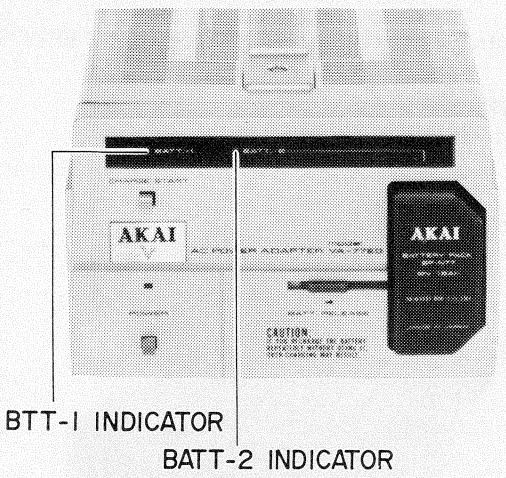


1. Insert a battery pack into the recorder or the adapter, or into both.
   Press the POWER button on the adapter to ON.



2. After making sure that the recorder is in the Stop mode, press the POWER button on the recorder to OFF.

3. Press the CHARGE START button on the adapter.

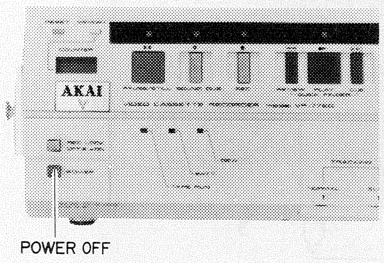


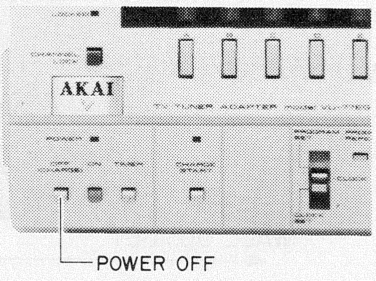
Checking the charging condition

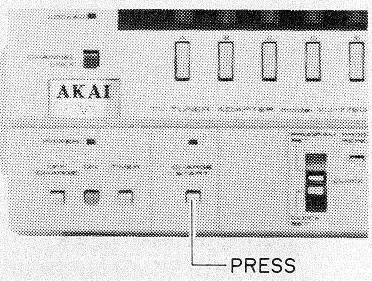
- During charging, either one of the BATT indicators remains lighted. The indicator turns off when the battery pack is fully charged.
- The BATT-1 indicator takes care of the battery installed in the recorder, and the BATT-2 indicator the battery installed in the adapter.
- If two batteries are to be recharged in series, recharging time is about 3 hours.
- Recharging will be finished in about 90 minutes when one battery, installed either in the recorder or adapter, is being recharged.
- Recharging automatically stops if you press the POWER button of the recorder to ON during recharging. If you continue recharging, press the POWER button of the recorder to OFF and press the CHARGE START button of the adapter once again.

Using the VU-77EG/EK Tuner/Adapter

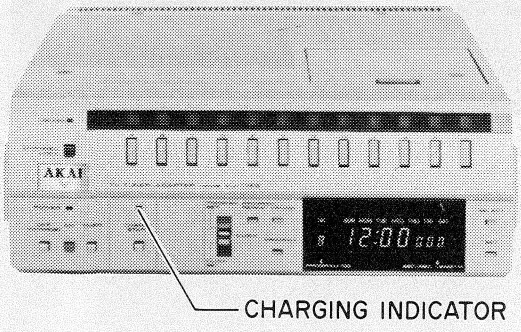
The VU-77EG/EK can recharge the battery pack installed in the recorder.







1. After confirming that the recorder is in the Stop mode, press the POWER button of the recorder to OFF.
2. Insert a battery pack into the battery compartment of the recorder and press the POWER OFF button of the Tuner/Adapter.
3. Press the CHARGE START button of the Tuner/Adapter.

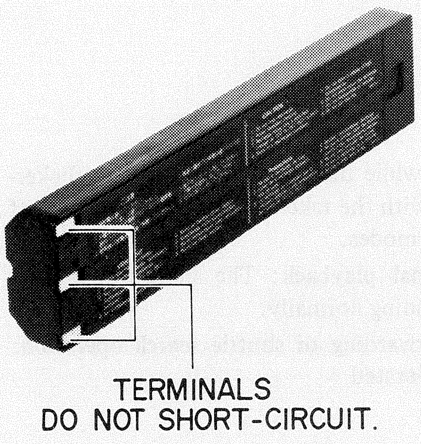


Checking the charging condition

- During charging, the LED indicator above the CHARGE START button of the Tuner/Adapter remains lighted. The indicator turns off when the battery pack is fully charged.
- Charging time is about 90 minutes.
- Immediately after the battery pack has been fully recharged, it may have become warm. This is not due to any defect of the battery pack.

1-11. A WORD ON THE BP-N77 EXCLUSIVE BATTERY PACK

The BP-N77 is a nickel-cadmium battery. Give attention to the following to make the most of its characteristics.



Temperature ranges

The recharging time is based on room temperature of 20°C with a power supply of 220V (EG-version) or 240V (EK-version). The lower the temperature, the longer the recharging time.

For charging: 10°C to 35°C
For operating: –10°C to 40°C
For storing: –10°C to 30°C

- Before each use, fully recharge the battery pack.
- Even when you are not using the battery pack, it will gradually discharge of itself. This natural discharging is accelerated as the ambient temperature rises. Therefore, it is recommended that you store the battery pack at a place of low temperatures.
- Do not discard the battery pack into a fire or do not leave it continuously exposed to high temperatures.
- The battery pack has its own service life. If its operating time becomes exceeding short even though you recharge it correctly, it means that the battery pack is nearing the end of its service life. Replace with a fresh one in such cases.

Cution

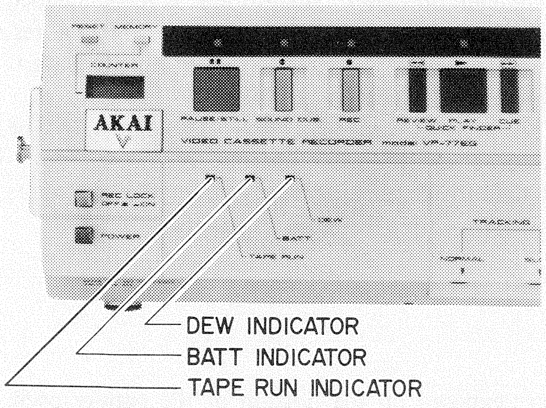
The terminals are exposed on the bottom of the battery pack. DO NOT short-circuit these terminals.

- If they are shorted, a great amount of current flows. This is not only very dangerous, but also makes the battery pack unusable.
- When transporting or storing the battery pack, exercise special care so that no metallic object touches the terminals.
- Always keep the terminals clean. If they become dirty, wipe them with a piece of soft cloth.

1-12. TAPE RUNNING, MOISTURE CONDENSATION AND BATTERY POWER INDICATORS

To assure worry-free operation, the VP-77EG/EK is equipped with LED indicators; one for tape running, one for battery power and one for moisture condensation. These indicators function when the POWER button is pressed to ON.

INDICATORS



TAPE RUN indicator

This indicator flickers red while the tape is running. The flickering speed is synchronized with the take-up reel speed. It turns off in the Stop, Pause and Still modes.

During recording or normal playback: The indicator flickers showing that the tape is running normally.

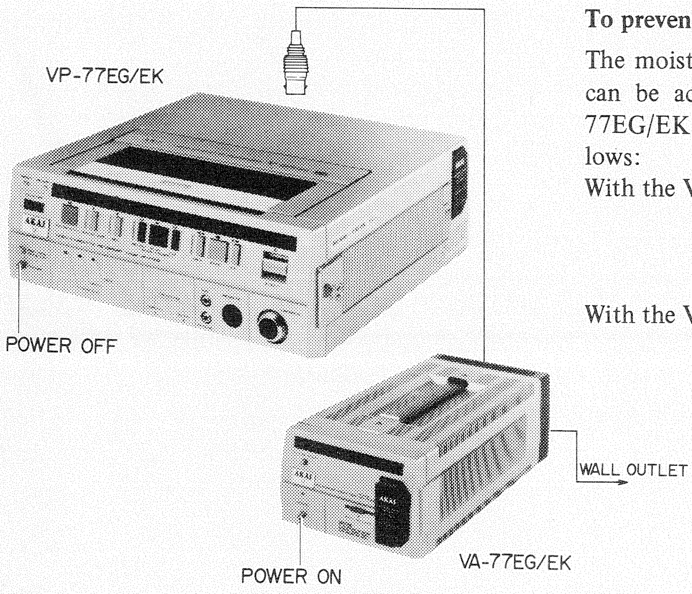
During rewinding, fast forwarding or shuttle search operation: The flickering speed is accelerated.

BATT indicator

During battery operation this indicator warns of insufficient power. If it lights red, recharge the battery pack or replace it with a fully charged one.

DEW indicator

- Moisture condensation on the head drum, one of the most crucial parts of the video recorder, will cause damage to the tape.
- Moisture in the air will condense on the head drum when you move the unit from a cold place to a warm place, after heating a cold room or under extremely humid conditions.
- The DEW indicator informs you that moisture has condensed inside the unit. As long as the DEW indicator remains lighted red, the VP-77EG/EK cannot be operated.
- If the DEW indicator lights red when you have powered the recorder, you must wait for a few hours until the indicator turns off.



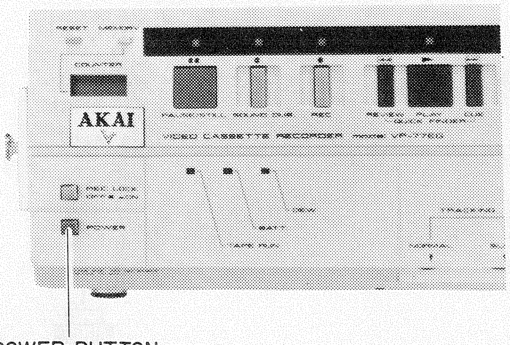
To prevent moisture condensation

The moisture condensation prevention heater inside the recorder can be activated if you leave either the VU-77EG/EK or VA-77EG/EK connected to the recorder and set these units as follows:

With the VU-77EG/EK:	The OFF button of the VU-77EG/EK should be engaged and the POWER button of the VP-77EG/EK should be OFF.
With the VA-77EG/EK:	The POWER button of the VA-77EG/EK should be ON and the POWER button of the VP-77EG/EK should be OFF.

When not using the recorder for a long period of time, unplug the VU-77EG/EK or VA-77EG/EK from the AC outlet to save energy.

1-13. POWER BUTTON AND RECORDING LOCK BUTTON

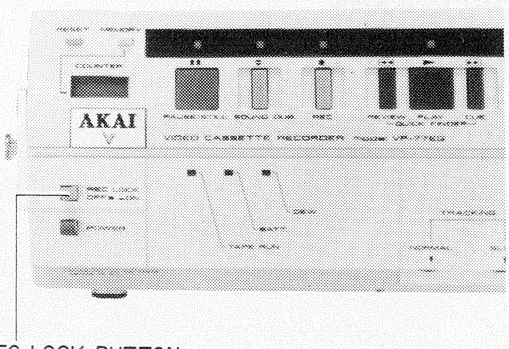


POWER BUTTON

POWER button

When this button is pressed to ON (▬), the recorder is powered and starts consuming power either from the built-in battery pack, car battery or AC via the VA-77EG/EK or VU-77EG/EK.

- When this button is pressed to ON, the STOP indicator lights informing you that the recorder is in the Stop mode.
- If you switch the power off in the Record or Play mode, the tape stops as it is loaded around the tape transport mechanism. And, when the power is re-applied, it automatically enters the Stop mode, unless the REC LOCK button is pressed in.
- When not in use, switch the power off to save power.



REC LOCK BUTTON

REC LOCK button

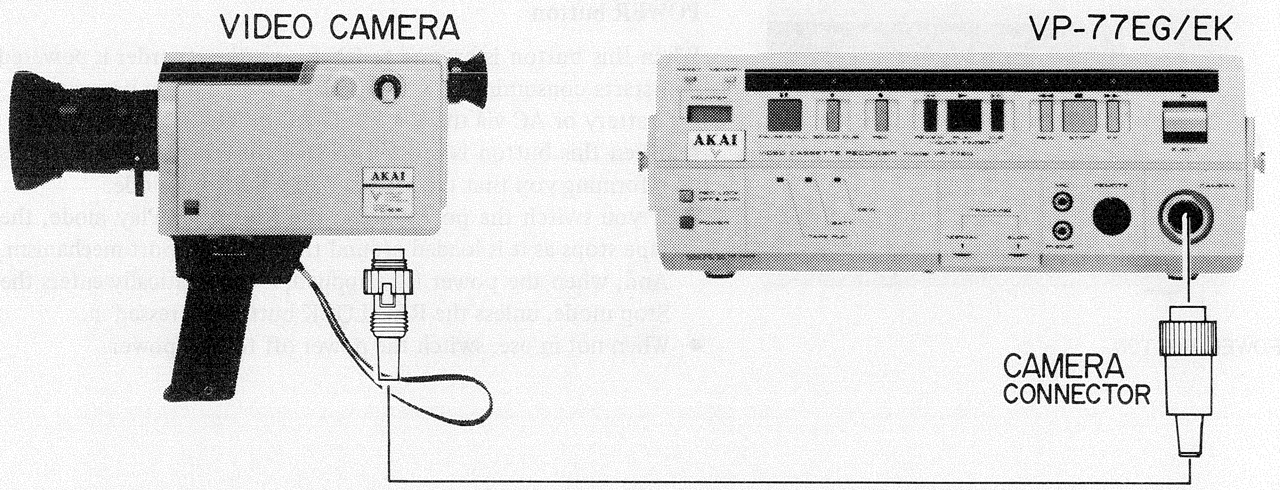
This button is especially helpful to save battery power when the recorder is used in combination with a camera.

- Since the ESC (Edit Start Control) system functions only when recording is initiated from the Pause mode (with the tape loaded around the tape transport mechanism), it is necessary to keep the Pause mode for obtaining clean assembled recordings. This also means that you have to keep powering the recorder.
- The REC LOCK button is incorporated to avoid such unnecessary power consumption while operating in the Recording Standby mode.
- You can switch off the power while in the Record mode. When you re-apply power, first press the REC LOCK button and then the POWER button. Then the tape will not enter the Stop mode, but directly start recording from the Pause mode allowing the ESC system to function as it should.
- If you leave the REC LOCK button engaged, you have only to press the POWER button to ON or OFF to control the starting and stopping of recording.

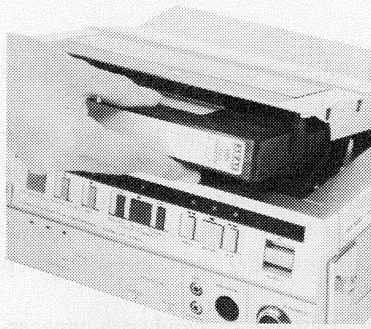
CAUTION:

If the POWER button is pressed to ON with the REC LOCK button engaged, recording automatically starts. If a prerecorded cassette is loaded, it will be erased and re-recorded. Make it a rule to release the REC LOCK button by pressing it again after using the Recording Standby mode lock facility.

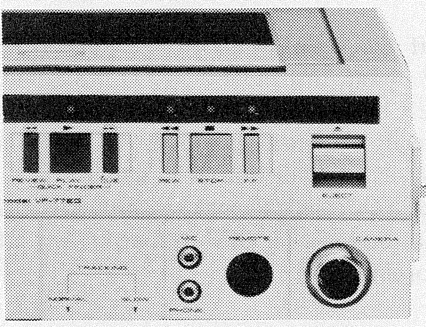
1-14. RECORDING WITH A VIDEO CAMERA



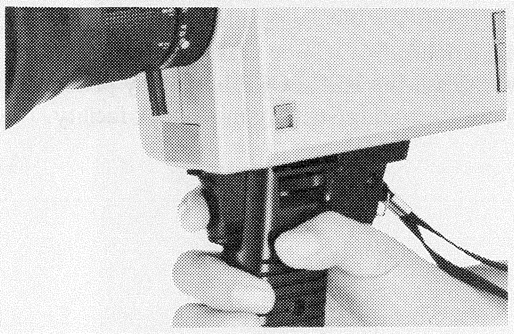
Operation



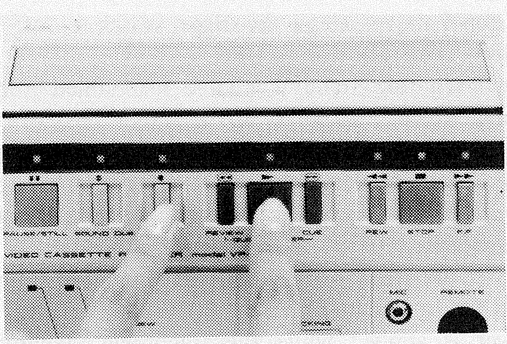
1. Load a video cassette correctly.



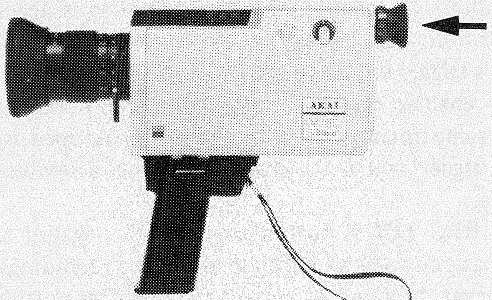
2. Press the POWER button of the recorder to ON.
   - The LED indicator above the STOP button will light.
   - The recorder will start consuming power.
   - This also will start supplying power to the camera, and if a monitor or TV receiver is connected to the recorder or if the electronic viewfinder is used, pictures can be monitored on the TV or viewfinder screen.



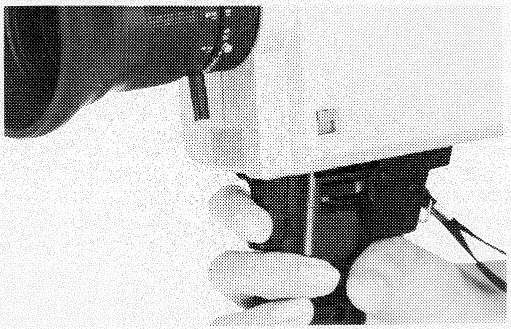
3. Make sure that the camera's trigger switch is in its "off" position.



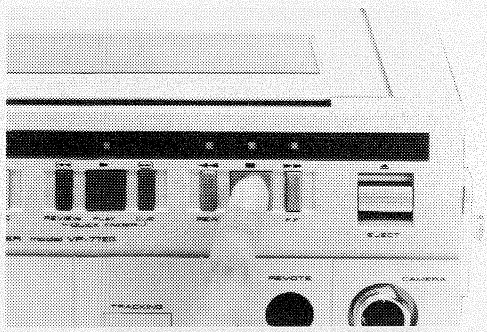
4. Press the REC and PLAY buttons simultaneously.
   - Recording does not take place as long as the camera's trigger switch is in its "off" position. This state is referred to as the "Recording Standby" mode.



5. Adjust the exposure, focus and composition, locking through the viewfinder.



6. Press the camera's trigger switch.
   - Recording will start, with both the REC and PLAY indicators lighting.
   - To stop recording temporarily, release the trigger switch to enter the Recording Standby mode.

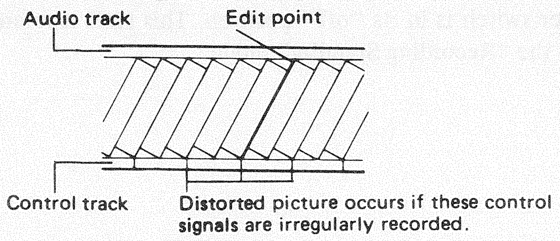


7. To end recording, press the STOP button of the recorder and then the POWER button to OFF.

NOTES:

- If you remain in the Recording Standby mode for longer than 5 minutes with the power on, the recorder automatically enters the Stop mode to protect the tape.
- If the battery power becomes insufficient during battery operation, the BATT indicator lights red and then the recorder automatically enters the Stop mode.

To produce clean assembled recordings


Audio track
Edit point
Control track
Distorted picture occurs if these control signals are irregularly recorded.

- The VP-77EG/EK incorporates the ESC (Edit Start Control) mechanism which minimizes picture distortion between separately recorded segments. As long as the starting and stopping of the tape is controlled by the camera's trigger switch, this ESC mechanism functions to start recording of the next segment exactly at the edit point.
- If you wish to stop recording longer than 5 minutes for preparing for the next shot, turn the power off to save battery power.
  However, even in such a case, clean assembled recordings can be made by using the REC LOCK button.

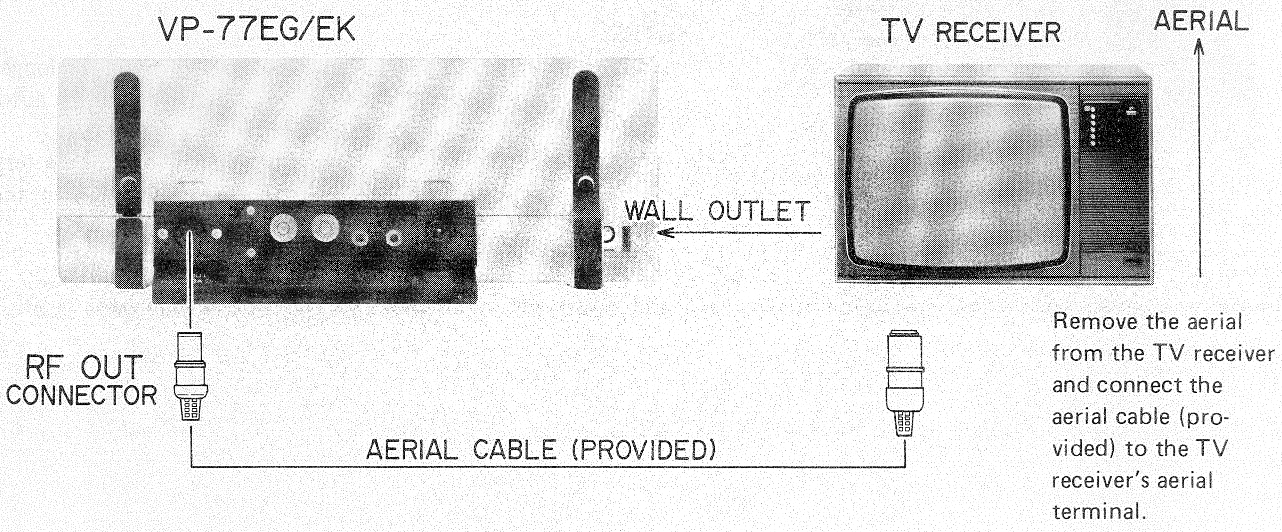
1. After step 6 above, release the trigger switch to "off".
2. Press the POWER button to OFF.
   - The Recording Standby mode is maintained even though power is switched off.
   - Take time to prepare for the next shot. Since the video head drum has stopped rotating, there is no need to worry about tape damage however long you remain in the Recording Standby mode.
3. When you are ready for the next shot, first press the REC LOCK button and then the POWER button.
   - Power is applied while the Recording Standby mode is engaged.
4. After about 10 seconds (this warm-up time is necessary for both the camera and the recorder), press the camera's trigger switch to start recording.
   - This enables the ESC mechanism to function in the same manner as if the tape was stopped by the trigger switch, producing smoothly assembled shots.
   - The REC LOCK button may be left engaged as long as you wish to continue assembled recordings. However, be sure to release it to OFF after putting the recorder in the Stop mode.

1-15. PLAYBACK USING A TV RECEIVER

Connection

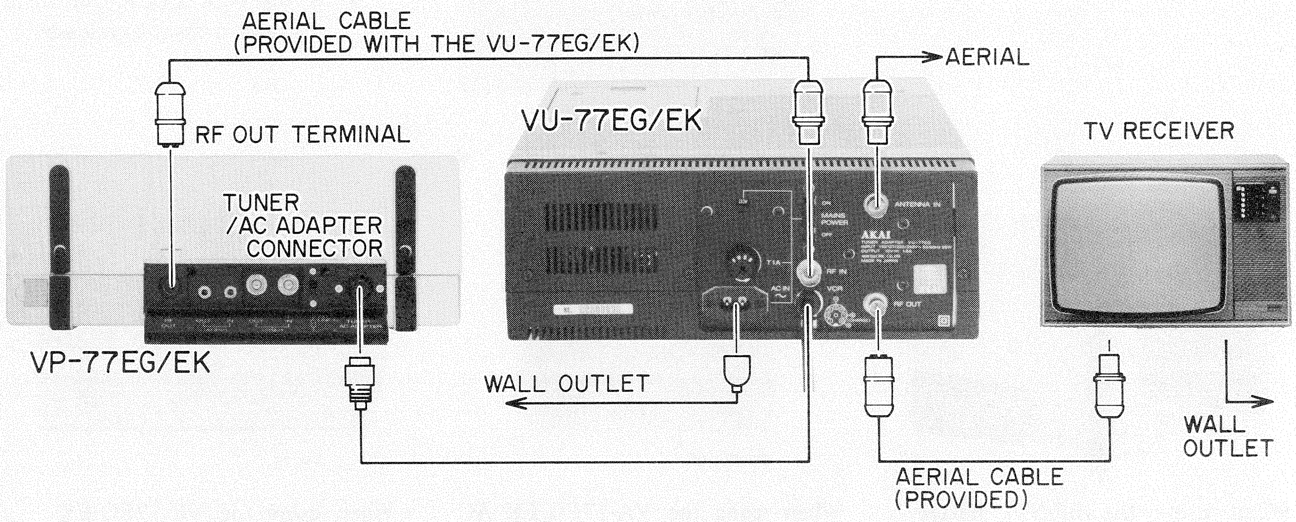
Connecting the VP-77EG/EK directly to a TV receiver.

NOTE: Employ a fully recharged battery pack. For continuous playback, one fully-charged battery pack lasts for about 2 hours. Do not leave a video camera connected; it will consume power even you are not using it.



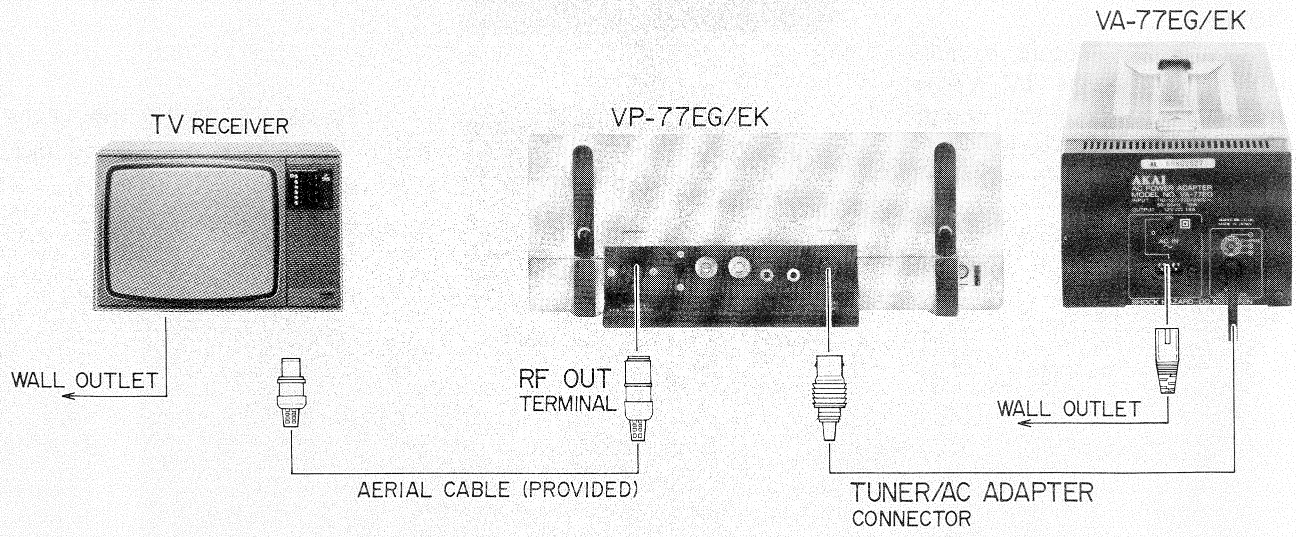
Remove the aerial from the TV receiver and connect the aerial cable (provided) to the TV receiver's aerial terminal.

Connecting the VP-77EG/EK to a TV receiver via the VU-77EG/EK Tuner/Adapter.

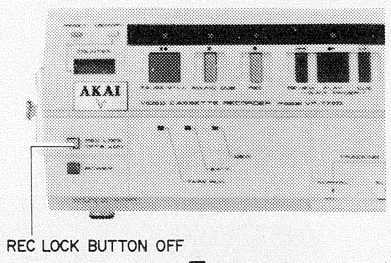

AERIAL CABLE
(PROVIDED WITH THE VU-77EG/EK)
AERIAL
RF OUT TERMINAL
VU-77EG/EK
TV RECEIVER
TUNER
/AC ADAPTER
CONNECTOR
VP-77EG/EK
WALL OUTLET
WALL
OUTLET
AERIAL CABLE
(PROVIDED)

* For more details, refer to the instruction manual for the VU-77EG/EK.

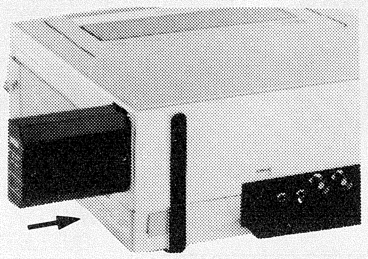
Connecting the VP-77EG/EK to a TV receiver for playback using the VA-77EG/EK AC Power Adapter.


VA-77EG/EK
TV RECEIVER
VP-77EG/EK
WALL OUTLET
RF OUT
TERMINAL
WALL OUTLET
AERIAL CABLE (PROVIDED)
TUNER/AC ADAPTER
CONNECTOR

Operation

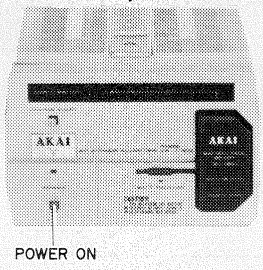


1. Load a pre-recorded cassette correctly and make sure that the REC LOCK button is released.
   - If the REC LOCK button is engaged, press it to release.



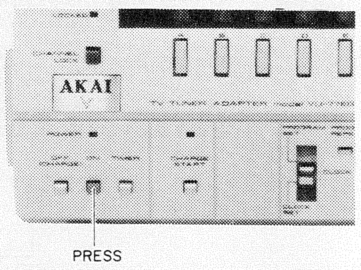
When using the BP-N77 battery pack

2. Install the fully-charged battery back into the VP-77EG/EK.



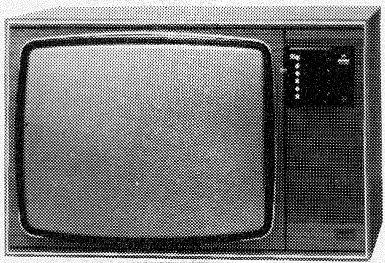
When using the VA-77EG/EK AC Power Adapter

2. Set the POWER button of the VA-77EG/EK to ON.



When using the VU-77EG/EK Tuner/Adapter

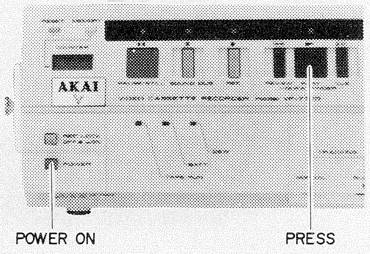
2. Press the sub-power ON button of the VU-77EG/EK.



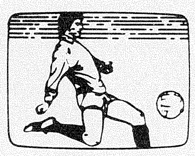
3. Set the TV receiver's channel selector to the RF converter output channel (your video channel).

NOTE:

If hum noise is heard or noise bars appear on the TV receiver when you are using the recorder placed on the TV receiver, keep the recorder away from the TV receiver.



4. Press the POWER button of the VP-77EG/EK to ON and then press the PLAY button.



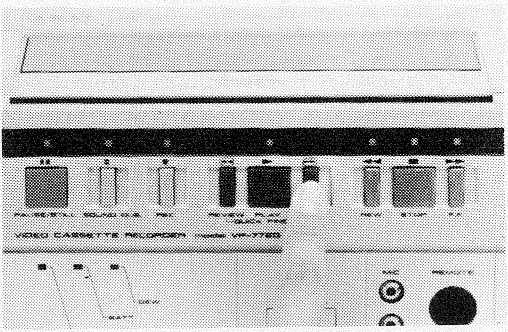
NOTE:

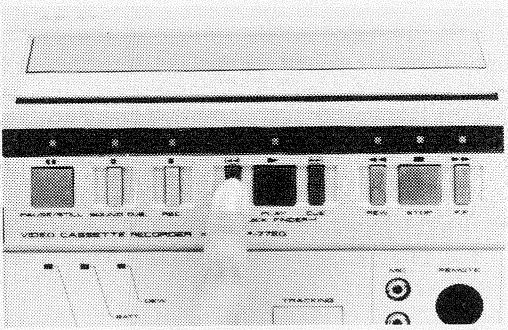
If the playback picture contains noise bars.

Is the TRACKING NORMAL control of the recorder properly adjusted? Turn the knob to centre until a click is heard. If noise bars still appear, turn the knob slowly in either direction until they move out of the screen. Recording should always be done with this control returned to centre.

1-16. QUICK FINDER AND VARIABLE-SPEED PLAYBACK

The VP-77EG/EK permits variable-speed playback. Among several different modes, the Quick Finder and Still playback can be performed with both the recorder's controls and the remote control unit, while slow-motion playback and frame advancing are possible only via the remote control unit.





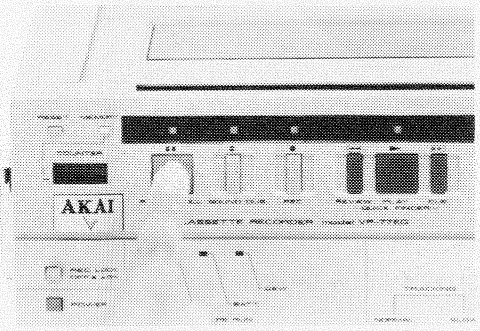
Quick Finder function

Forward or reverse playback at a speed about 10 times the normal is called "quick finder" and is useful to find a particular tape segment quickly while also referring to the picture on the screen.

- Engage the Play mode by pressing the PLAY button.
- To quick finder in the forward direction, press the QUICK FINDER CUE button. The tape will be played back at a speed about 10 times the normal while the button is being pressed.
- To quick finder in the reverse direction, press the QUICK FINDER REVIEW button. The tape will be played back in the reverse direction at a speed about 10 times the normal while the button is being pressed.
- When the button is released, normal playback is resumed.

NOTES:

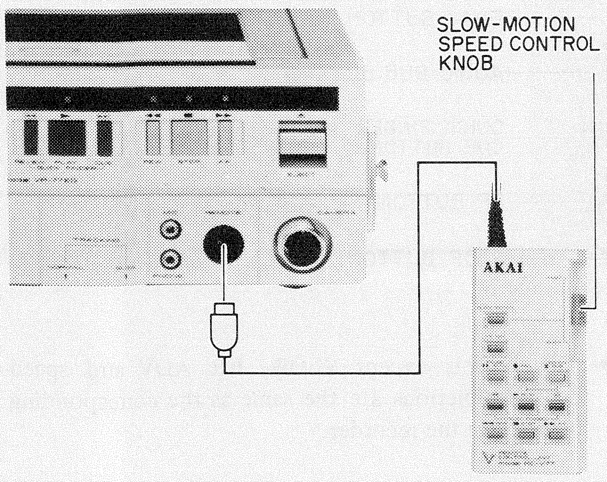
- Several noise bars will appear during quick finder operation. This is not due to any defect of the unit.
- If the picture rolls vertically, make adjustment using the TV receiver's V-hold control.



Still-frame playback

- Engage the Play mode by pressing the PLAY button.
- To view a still picture, press the PAUSE/STILL button.
- To stop still-frame playback, press the PLAY button.

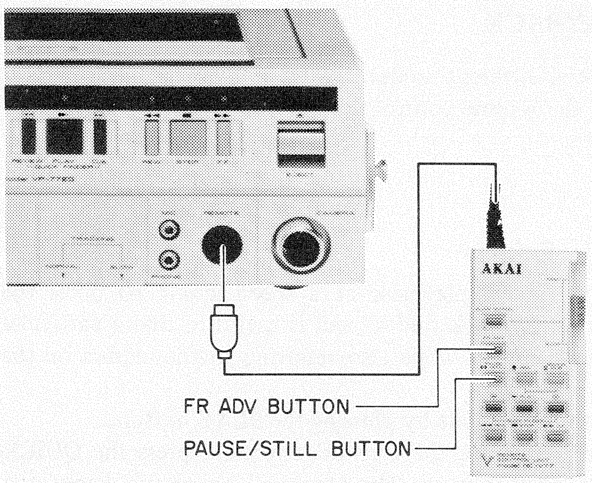
NOTE: If you remain in the Still mode continuously for longer than 5 minutes, the recorder automatically enters the Stop mode.



Slow-motion playback using the remote control unit

- Connect the provided remote control unit to the REMOTE connector of the recorder.
- Engage the Play mode by pressing the PLAY button.
- To start slow-motion playback, press the SLOW button.
- To vary the slow-motion speed, slide the speed control until you get the desired speed; toward FAST for faster speeds and SLOW for slower speeds.
- To restore the normal playback, press the PLAY button.

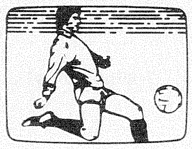
NOTE: If you remain in the Slow mode continuously for longer than 5 minutes, the recorder automatically enters the Stop mode.


AKAI
FR ADV BUTTON
PAUSE/STILL BUTTON

Frame-advance playback using the remote control unit

- Connect the provided remote control unit.
- Engage the Play mode by pressing the PLAY button.
- Press the PAUSE/STILL button.
- Then press the FR ADV button. Pressing it once advances the picture by one frame. Keeping it pressed advances the picture by one frame per second.
- To restore the normal playback, press the PLAY button.

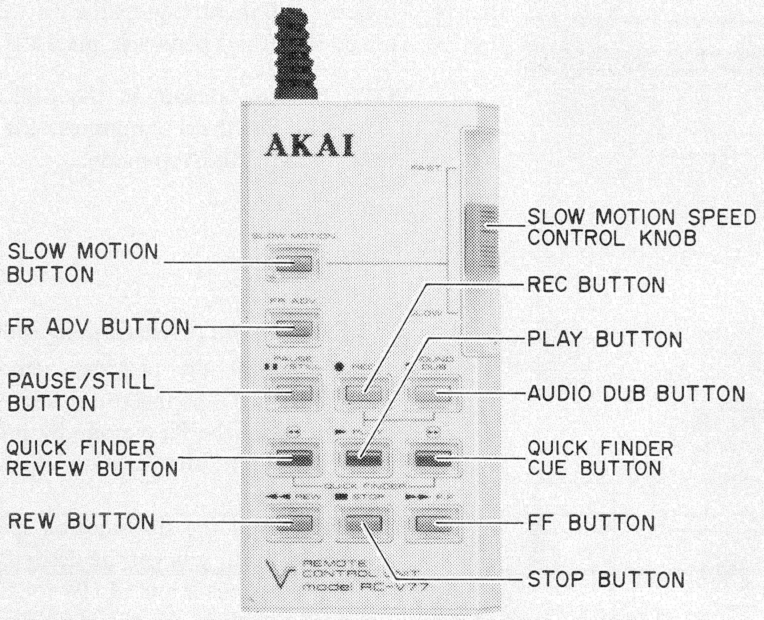
  NOTE: If you remain in the Frame-advance mode continuously for longer than 5 minutes, the recorder automatically enters the Stop mode.



NOTE: Noise bars may appear during still-frame, slow-motion and frame-advance playback. In such a case, first check to see if the SLOW TRACKING control has gotten out of place. First turn the SLOW TRACKING control to the centre until a click sound is heard. If noise still remains, engage the Slow-motion mode and turn the SLOW TRACKING control slowly in either direction until the noise bars move out of the frame.

- If noise bars cannot be removed by adjusting the TRACKING control, consult your local AKAI dealer.

Remote control unit

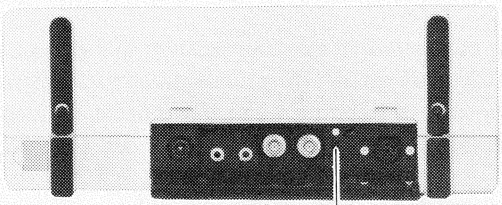

AKAI
SLOW MOTION BUTTON
FR ADV BUTTON
PAUSE/STILL BUTTON
QUICK FINDER REVIEW BUTTON
REW BUTTON
SLOW MOTION SPEED CONTROL KNOB
REC BUTTON
PLAY BUTTON
AUDIO DUB BUTTON
QUICK FINDER CUE BUTTON
FF BUTTON
STOP BUTTON

- The provided remote control unit is exclusively for use with the VP-77EG/EK.
- Connection should be made to the REMOTE connector on the front panel.
- All controls except SLOW, FR ADV and speed control functions are the same as the corresponding buttons on the recorder.

The recorders controls are operative even when the remote control unit is connected.

1-17. RECORDING OFF-AIR TV PROGRAMMES USING THE VU-77EG/EK TUNER/ADAPTER

The VP-77EG/EK permits recording off-air TV programmes when combined with the VU-77EG/EK Tuner/Adapter (optional).

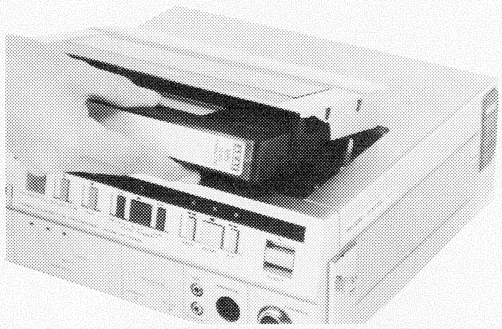


SELECT SWITCH

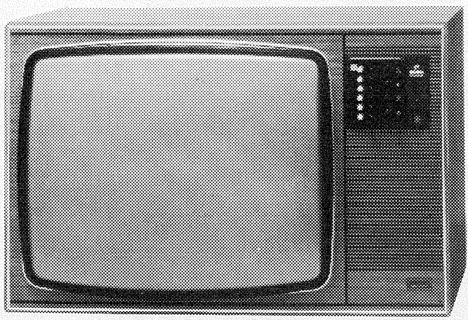
EXT LINE IN/TUNER

- Connect the VU-77EG/EK and TV receiver correctly to the VP-77EG/EK.
  For connection, refer to page 1-16.
- Switch the power on for these units.

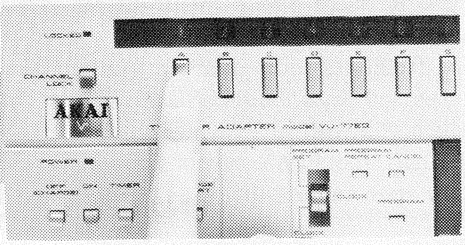
1. Set the EXT LINE IN/TUNER select switch, located on the rear panel of the VP-77EG/EK, to TUNER.



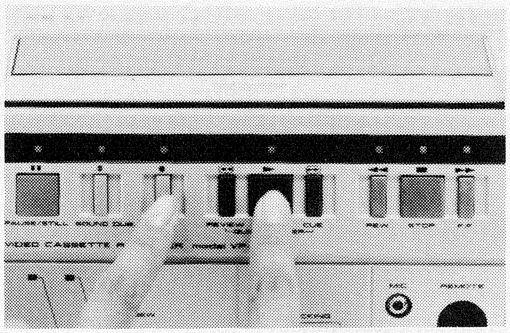
2. Load a video cassette correctly.
   - Make sure that the cassette safety tab is in place.



3. Set the TV receiver's channel selector to the RF converter output channel (your video channel).



4. Press the channel select button of the VU-77EG/EK corresponding to the channel you wish to record.



5. Press the REC and PLAY buttons simultaneously.
   - This will start recording of the programme appearing on the TV screen.
   - To stop recording, press the STOP button.

CAUTION

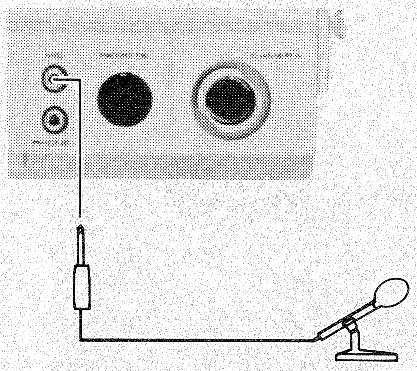
If a video camera is connected to the front panel CAMERA connector during recording of off-air TV programmes, the camera signals have priority and will be recorded. Disconnect a video camera when you wish to record off-air TV programmes.

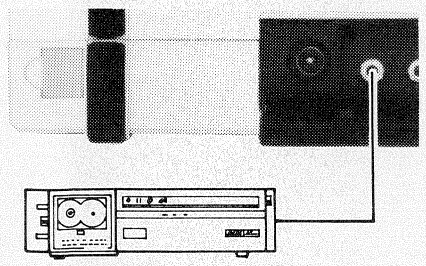
Recording one TV programme while watching another

Set the VU-77EG/EK for recording one TV programme in the same manner as described in steps 1 – 5, and set the TV receiver channel to any other channel you wish to view.

1-18. AUDIO DUBBING

Audio dubbing means recording a sound track on a prerecorded cassette. Sound from a source connected to the rear panel AUDIO IN connector of the VP-77EG/EK or from a microphone connected to the front panel MIC jack can be recorded.

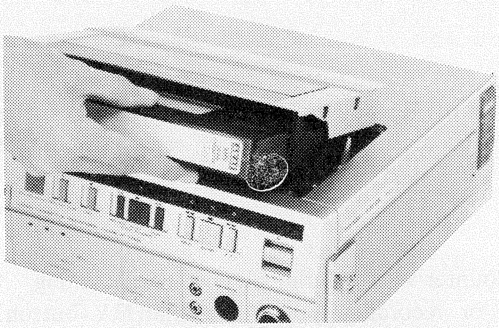




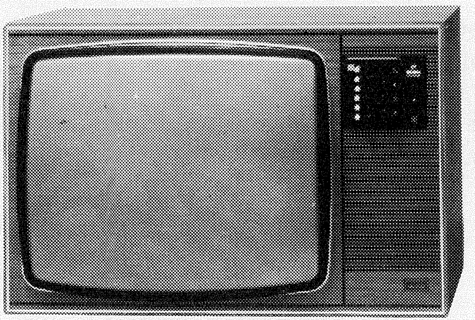
- Connect the VP-77EG/EK to the VU-77EG/EK or VA-77EG/EK and the TV receiver correctly.
- Connect a microphone to the front panel MIC jack when recording a narration or a song through the microphone.
- Connect a tape recorder or other audio sources to the rear panel AUDIO IN connector when recording background music or other previously recorded audio. In this case, the rear panel EXT LINE IN/TUNER select switch should be set to EXT LINE IN.
- The pause function facilitates audio dubbing. First play back the pre-recorded tape and press the PAUSE/STILL button at the point from which you wish to start audio dubbing. Then press the AUDIO DUB and PLAY buttons simultaneously. This permits you to start audio dubbing exactly at the right point.

NOTES:

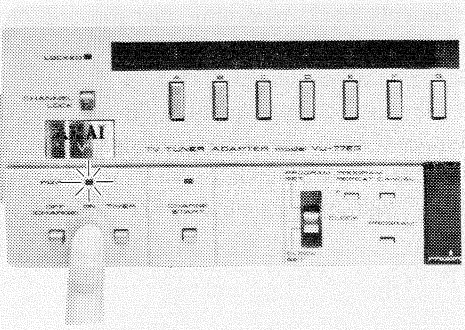
- The previously recorded sound is erased and replaced with a new sound track by audio dubbing.
- If the MIC jack and the AUDIO IN connector are used at the same time, the input from the MIC jack has priority.



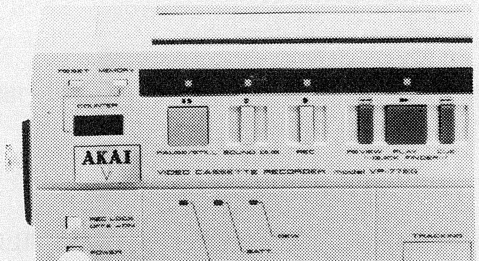
1. Load a pre-recorded cassette.



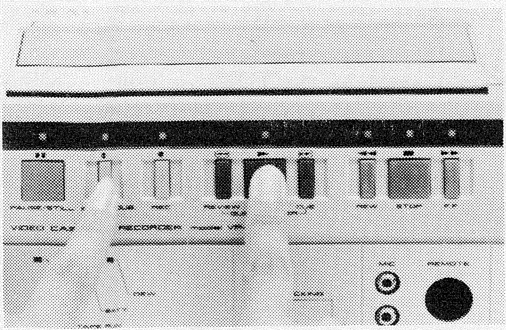
2. Set the TV receiver channel to the channel of the RF converter to monitor the playback picture while dubbing audio.



3. Switch the power on for the VA-77EG/EK or VU-77EG/EK.



4. Press the POWER button of the VP-77EG/EK to ON.



5. Press the AUDIO DUB and PLAY buttons simultaneously.
   - The AUDIO DUB and PLAY indicators will light and audio dubbing will start.

If the AUDIO DUB indicator does'not light

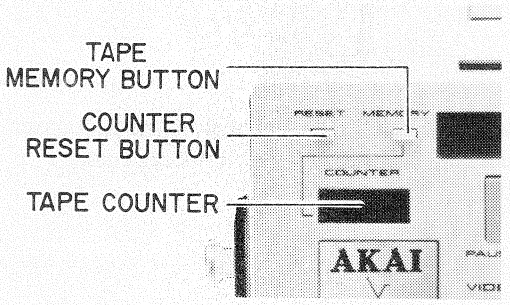
Check to see if the cassette safety tab is in place. If it has been broken and removed, reseal the slot with cellophane tape.

- If whistling or howling is heard during audio dubbing, reduce the TV volume or move the microphone farther away from the TV. Recording is being performed even if sound is not heard from the TV receiver. If you want to monitor the sound being recorded, connect the provided earphone to the EAR jack.

1-19. ADDITIONAL FACILITIES

Tape counter and tape memory function

When the MEMORY button is pressed, the tape will stop automatically in the Rewind and Fast Forward modes at the counter reading of "0". This facility is convenient when you wish to view a specific tape section repeatedly or the section that you have recorded just before.

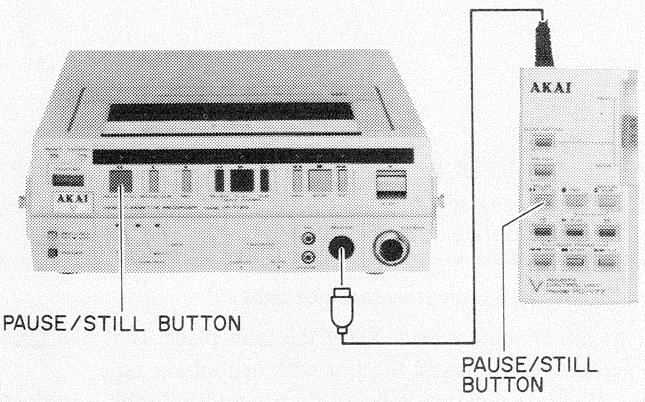


1. Reset the tape counter to "0" during playback or recording.
2. After playback or recording, press the MEMORY button. "M" will appear at the bottom left-hand corner of the tape counter display.
3. Press the REW button. The tape will rewind and stop at the counter reading of "0".
   - Depending on the situation, search for "0" is also possible by pressing the FF button.
4. Press the PLAY button to resume playback.

NOTES:
- If you wish to cancel the memory function once you have engaged the MEMORY button, simply press the MEMORY button again. The indication "M" will disappear.
- The Memory mode is automatically released with the indication "M" disappearing, when the tape stops at the counter reading of "0".
- While the tape is being wound in the forward direction (playback, recording, fast forward, etc.), the counter reading advances in the direction of increasing numbers, such as 0, 1, 2, 3 . . .
- While the tape is being wound in the reverse direction (rewind, etc.), the counter reading changes in the direction of decreasing numbers and after "0" a "minus" sign appears, such as 3, 2, 1, 0, –1, –2, –3 . . .

Pause facility

The PAUSE/STILL button permits stopping the tape temporarily during recording. While the tape is stationary, the input signals can be seen and heard. This facility is convenient to eliminate unwanted material from your recordings.

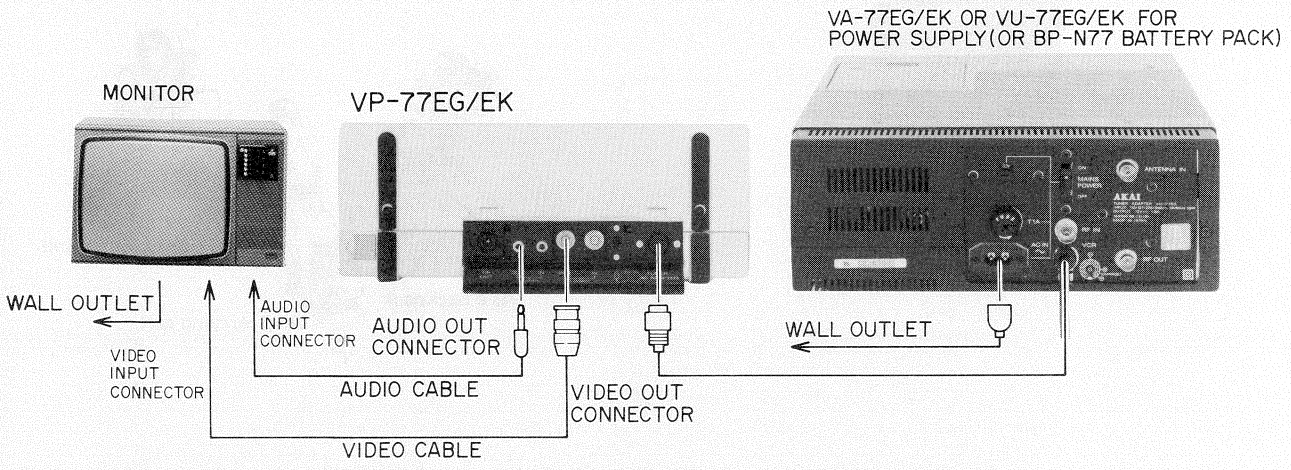


During recording . . .	Employ the PAUSE/STILL button to stop the tape temporarily.
During playback	Employ the PAUSE/STILL button to view a still picture.

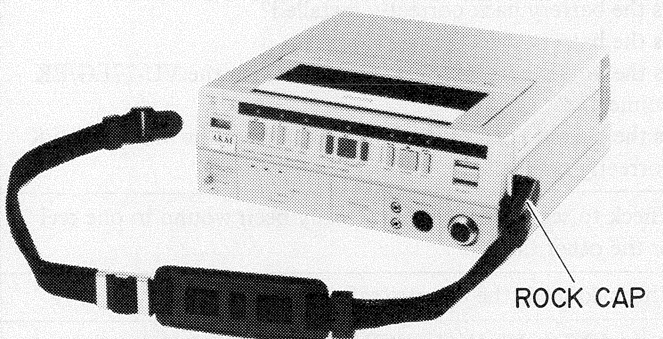
NOTES:
- If you continue the Pause or Still mode for longer than 5 minutes, the recorder automatically enters the Stop mode.
- To release the Pause or Still mode, press the PLAY button.

1-20. CONNECTING TO A VIDEO MONITOR

The VP-77EG/EK can be connected to a video monitor. If you employ a portable monitor, you can check your camera recordings on the spot.

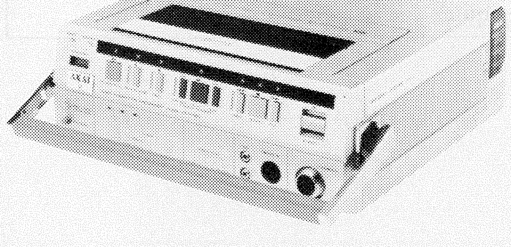

VA-77EG/EK OR VU-77EG/EK FOR POWER SUPPLY(OR BP-N77 BATTERY PACK)
MONITOR
VP-77EG/EK
WALL OUTLET
AUDIO INPUT CONNECTOR
AUDIO OUT CONNECTOR
VIDEO INPUT CONNECTOR
AUDIO CABLE
VIDEO OUT CONNECTOR
VIDEO CABLE
WALL OUTLET

1-21. ATTACHING THE SHOULDER STRAP OR CARRYING HANDLE



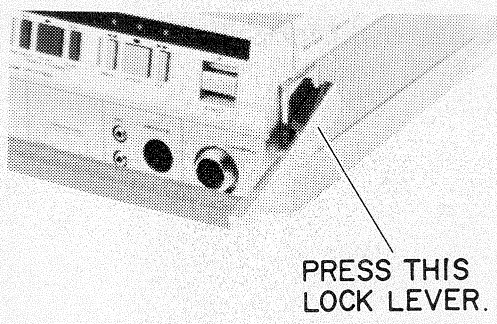
Attaching the shoulder strap

- Open the lock caps on both ends of the shoulder strap and hook the lugs onto the strap/handle retainers.
- Close the lock caps.
- To remove the shoulder strap, first open the lock caps.



Attaching the carrying handle

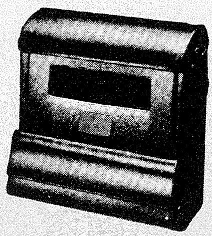
- Apply the carrying handle from the front of the recorder as illustrated.
- Then pull the handle forward. This allows it to be fixed to the strap/handle retainers.


PRESS THIS LOCK LEVER.

- To remove the handle, press the lock levers on both ends of the carrying handle and push the handle toward the rear of the unit.

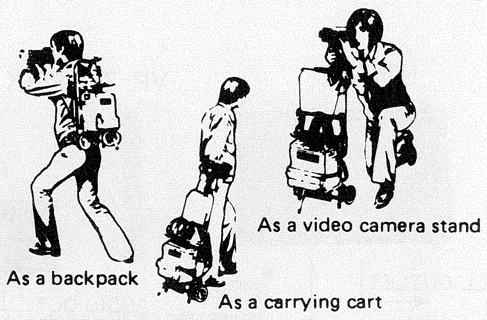
1-22. CARRYING CASE AND SHOULDER CART (OPTIONAL)

Two different carrying cases are available for the VP-77EG/EK.



VG-V77

The SC-V77 Shoulder Cart is a multi-purpose unit that can be used either as a carrying cart or a backpack. Employ this unit for on-location recording.



1-23. IN CASE OF DIFFICULTY

Symptoms	Check points
No power is applied when the POWER button is pressed to ON.	● Is the battery pack correctly installed? ● Is the battery pack charged? ● Is the power cord of the VA-77EG/EK or the VU-77EG/EK connected? ● Is the output cord of the VA-77EG/EK or the VU-77EG/EK correctly connected?
Rewinding or fast forwarding is impossible.	● Check to see if the tape has already been wound to one reel or the other fully.
Recording or audio dubbing is impossible.	● Check to see if the cassette safety tab is in place.
Recording of TV programmes is impossible.	● Is the EXT LINE IN/TUNER select switch on the rear panel of the VP-77EG/EK set to TUNER?
Noise bars appear on the playback picture.	● Remove noise bars using the TRACKING controls. See page 1-26. ● Noise bars during quick finder cannot be eliminated.

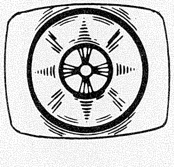
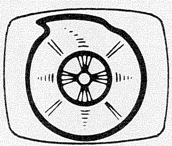
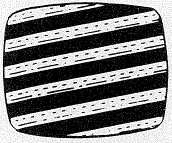
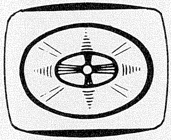
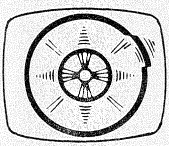
1-24. HEAD CLEANING

- Picture playback may become blurred or interrupted while the TV programme received is clear. This does not mean that the recorded programme has been erased.
- Dirt accumulated on the video heads after long periods of usage causes such troubles. In this case, head cleaning requiring highly technical care is necessary.

For head cleaning, consult the nearest AKAI dealer.

1-25. ADJUST YOUR TV RECEIVER WHEN . . . .

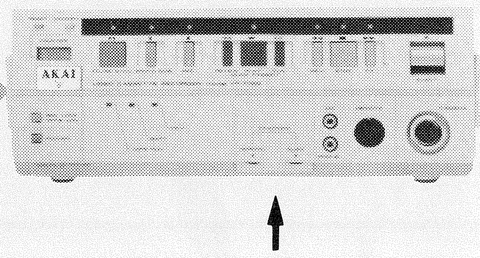
If your TV receiver shows the following symptoms during Still Playback or Slow-motion Playback using the VP-77EG/EK, adjust the TV receiver first.

Symptom	Adjustment
Picture vibrates vertically. 	Turn the V-Hold knob slightly for stabilizing.*
The upper portion of the picture drifts horizontally. 	Turn the H-Hold knob slightly for stabilizing.**
Picture rolls. 	Turn the H-Hold knob slightly for stabilizing.**
Picture is flattened vertically. 	Inherent in your TV receiver. Not adjustable.
Only a portion of the picture continues to flicker. 	Inherent in your TV receiver. Not adjustable.

If the V-Hold and H-Hold knobs are not provided on your TV receiver, please consult the AKAI store where you bought the VP-77EG/EK or your local AKAI dealer.

NOTE:

* If an unsatisfactory result is obtained, adjust a potentiometer under the small square cover located at the bottom of the unit so that a stable picture is obtained.



** If an unsatisfactory result is obtained, it is necessary to adjust the AFC circuit of the TV receiver.

SECTION 2

MECHANISM DESCRIPTION

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2-1. GENERAL

This model features simplified mechanical construction in comparison to earlier machines in the VHS series.
The chassis for supporting mechanical parts is made of FRP (fiber reinforced plastics) for further enhancing the unit's portability with its lightness.
The rotating video head drum is directly driven by a DC motor. A total of four motors are used in the system. The various interactions of the electronic and mechanical components are controlled by a microprocessor, which contributes to precise and reliable operation.
A description of the main mechanical functions is provided below.

2-2. MAIN COMPONENT FUNCTIONS

1. Drum motor
   A direct drive (DD) motor is used in conjunction with a servo circuit to control video head rotation.
2. Capstan motor
   The capstan motor regulates tape motion during record, play and slow modes. Its rotation is transmitted via the capstan belt to the capstan flywheel.
3. Reel motor
   A shifting idler is employed for transmitting the reel motor rotation to the supply and take-up reel disks. Rotation of the motor is bidirectional and performs tape take-up or supply in the record, play, shuttle search (S-FWD and S-REV), slow fast forward (FF), and rewind modes.

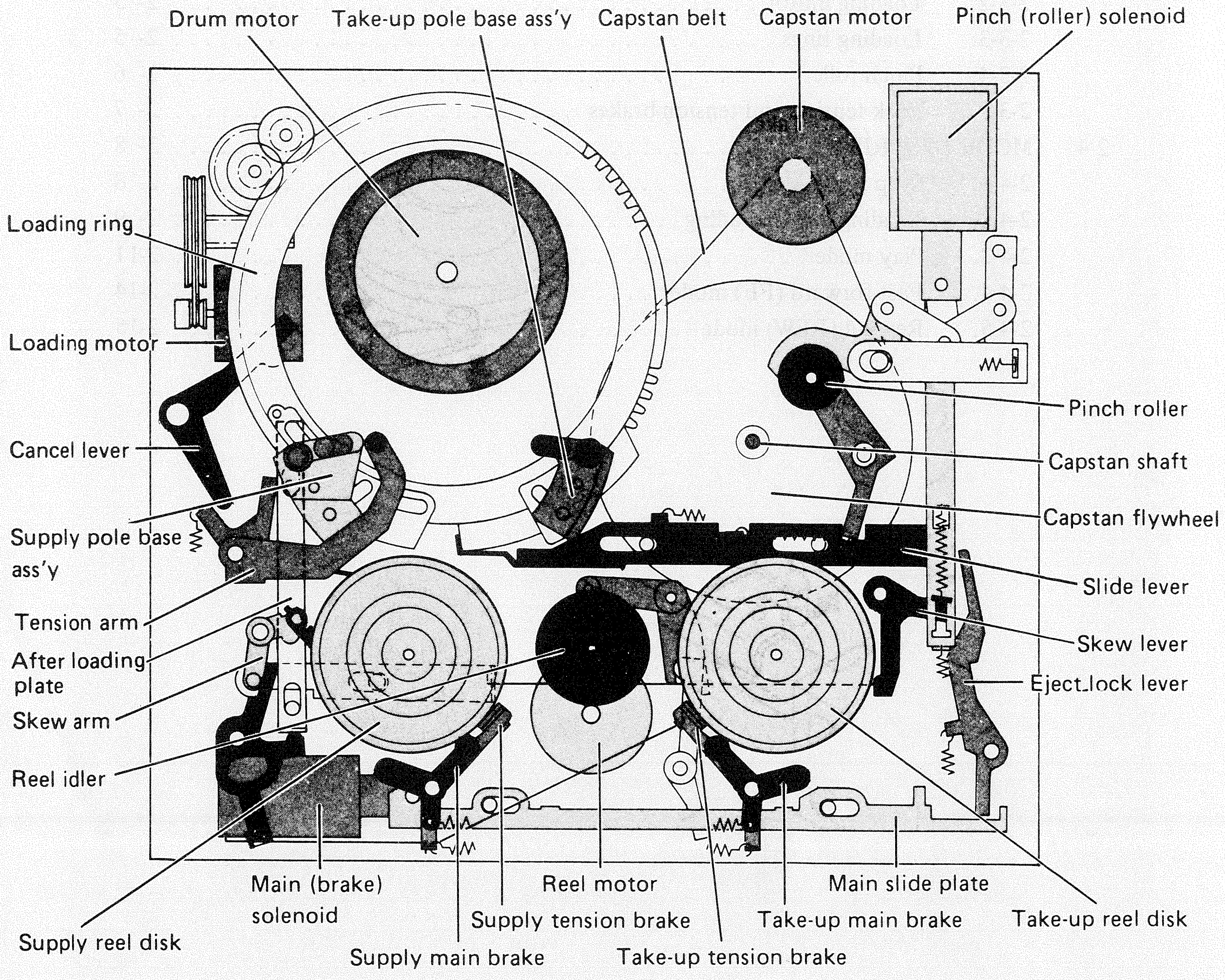
Drum motor
Take-up pole base ass'y
Capstan belt
Capstan motor
Pinch (roller) solenoid
Loading ring
Loading motor
Cancel lever
Supply pole base ass'y
Tension arm
After loading plate
Skew arm
Reel idler
Supply reel disk
Pinch roller
Capstan shaft
Capstan flywheel
Slide lever
Skew lever
Eject lock lever
Main (brake) solenoid
Supply main brake
Supply tension brake
Reel motor
Take-up tension brake
Main slide plate
Take-up main brake
Take-up reel disk

Fig. 2-1 Main part locations

4. Loading motor

   This motor is also bidirectional and functions to extract the tape from the cassette during loading and return it to the cassette during unloading.

5. Main solenoid

   According to the selected mode, the main solenoid functions to engage or release the main brakes, eject lock, reel idler mechanisms and brake switch.

6. Pinch roller solenoid

   This solenoid engages and releases the pinch roller pressure, tension band pressure and pinch switch.

2-3. MAIN COMPONENT OPERATIONS

2-3-1. Main solenoid

The main solenoid operates in all modes except the stop mode. Activation of the solenoid produces the following states.

1. Main brake release (Fig. 2-2)

   The solenoid plunger moves the main slide plate toward the left. Via the studs, this releases the main brakes from the supply and take-up reel disks.

2. Eject lock (Fig. 2-2)

   Shifting the main slide plate toward the left moves the eject lock lever to the right and locks the cassette housing. After loading completion, the slide lever restrains the eject lock lever. (See pinch roller 2-3-4.)

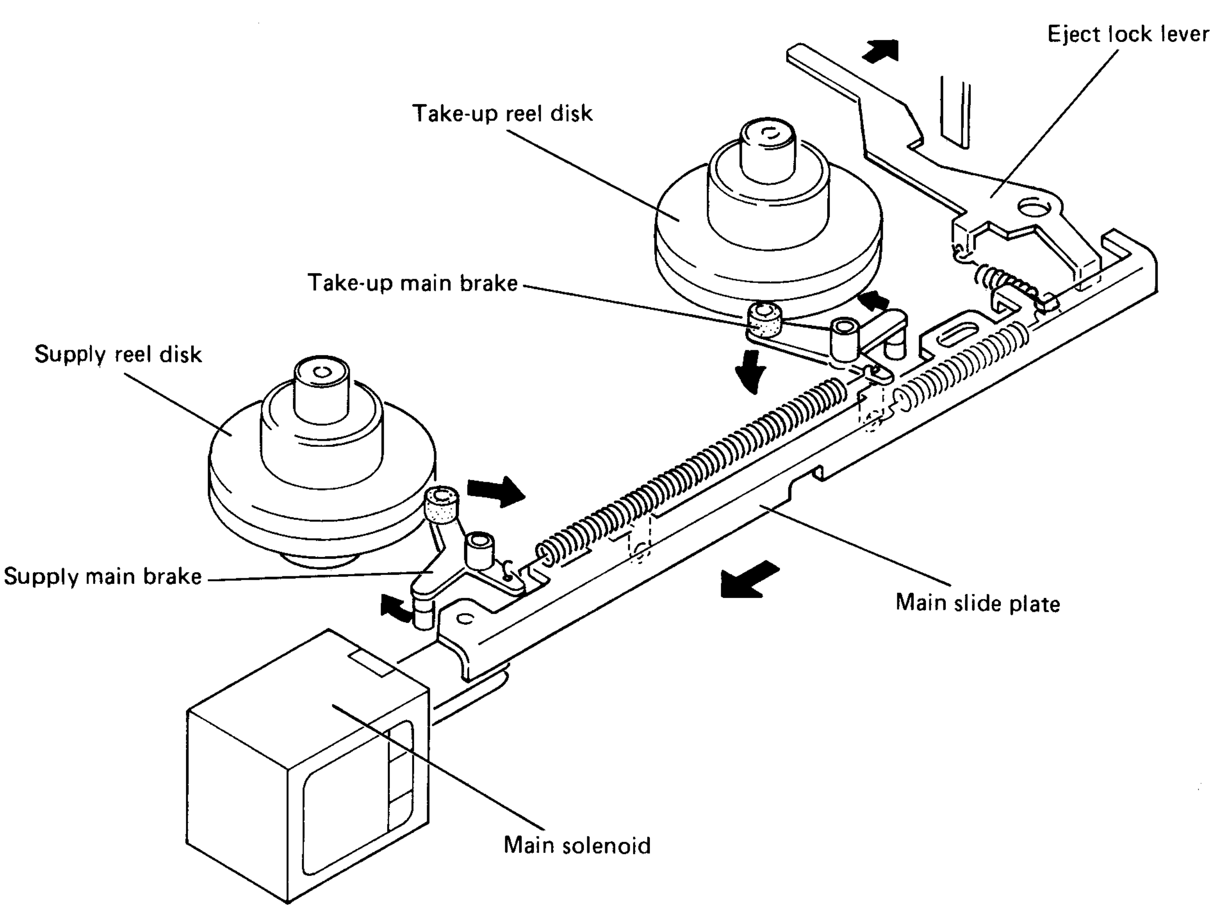
Eject lock lever
Take-up reel disk
Take-up main brake
Supply reel disk
Supply main brake
Main slide plate
Main solenoid

Fig. 2-2 Main brakes and eject lock

3. Reel disk drive (Fig. 2-3)

   With the main solenoid off, a spring pulls the main slide plate toward the right. A notch of the main slide plate controls idler lever-3. The reel idler assembly is regulated both in the lateral direction by the stud of idler lever-3 and in the longitudinal direction by a leaf spring.

   When the main solenoid is energized, the main slide plate overcomes the force of the spring and moves toward the left. This causes idler lever-3 to also move toward the left. The stud of idler lever-3 moves toward the right, freeing the reel idler assembly. At this time, when the rotational force of the reel motor overcomes the leaf spring, the reel idler assembly is forcibly brought into contact with the supply or take-up reel disk (depending on the rotating direction). As the motor continues to rotate, the reel disk also rotates.

4. Brake switch on

   When the main solenoid operates, the main slide plate sets brake switch on.

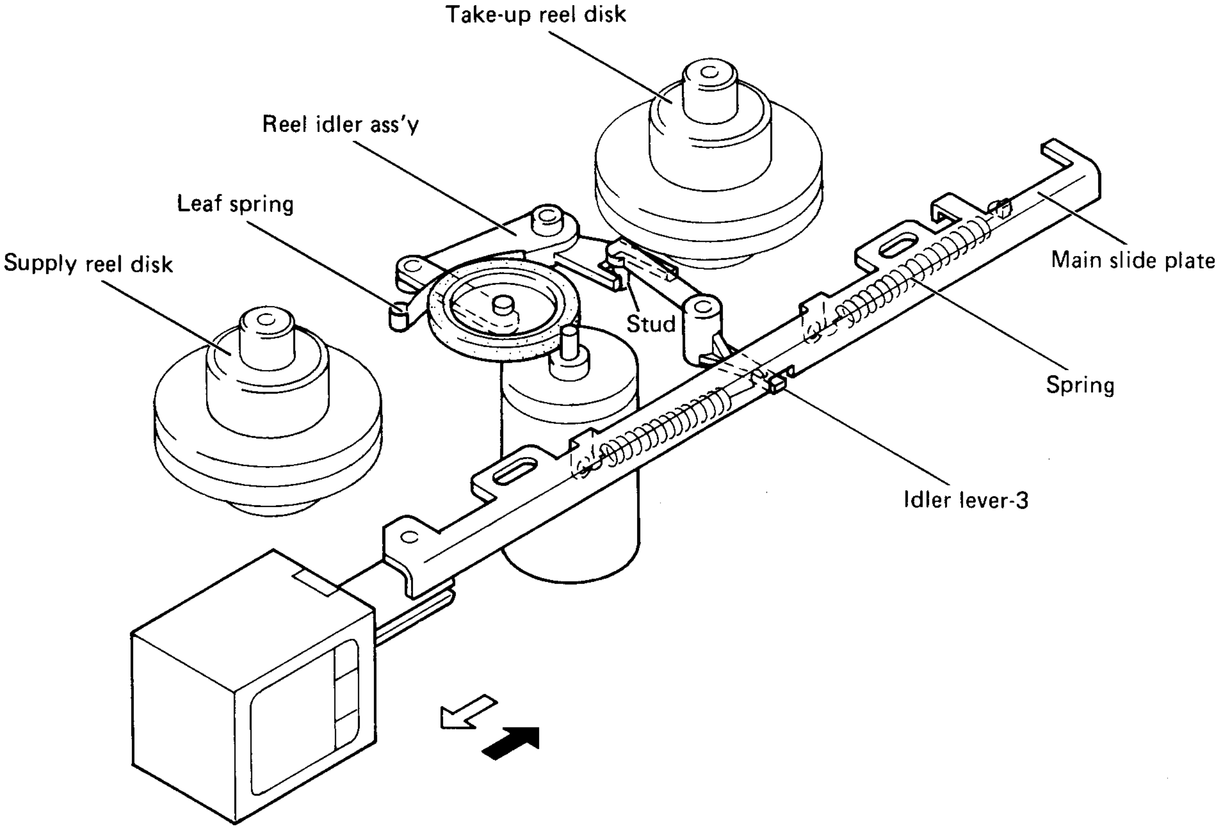
Take-up reel disk
Reel idler ass'y
Leaf spring
Supply reel disk
Stud
Main slide plate
Spring
Idler lever-3

Fig. 2-3 Reel disk drive

2-3-2. Loading motor

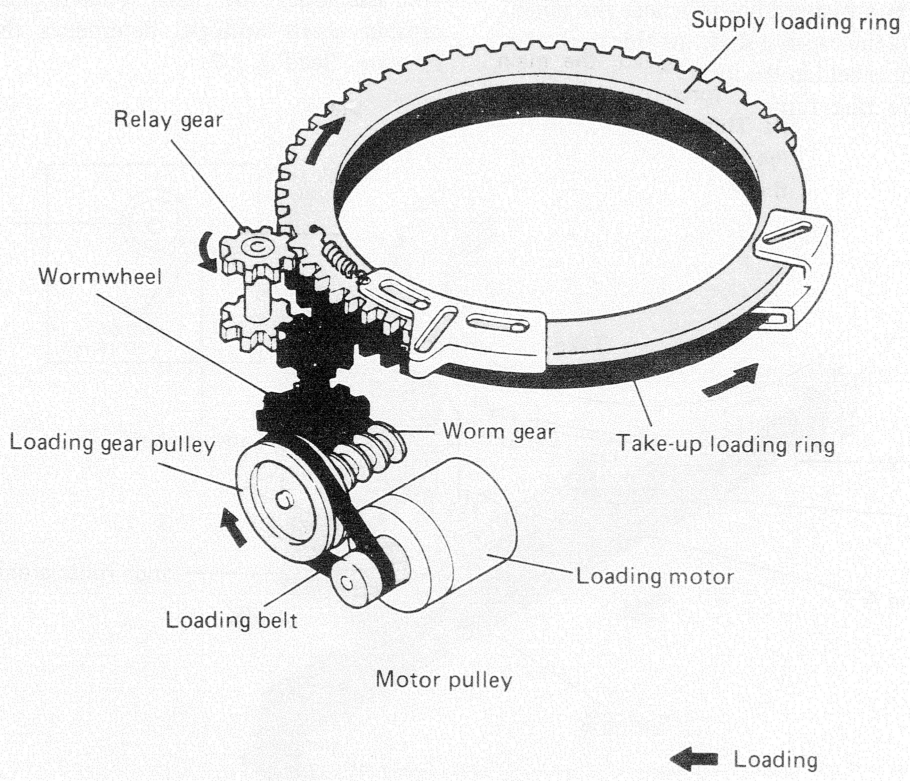
Supply loading ring
Relay gear
Wormwheel
Loading gear pulley
Worm gear
Take-up loading ring
Loading motor
Loading belt
Motor pulley
Loading

Fig. 2-4 Loading motor

The loading motor rotates only during the loading and unloading modes. As can be noted from the figure, the rotation is transmitted in the route: loading motor → motor pulley → loading belt → loading gear pulley → worm gear → wormwheel, then to the take-up loading ring and via the relay gear to the supply loading ring. The loading rings then rotate.

2-3-3. Loading rings

1. A slide ring is included with the supply loading ring, as shown in the figure. The pin of the supply pole base rides in the slot of the slide ring.
   Tape is extracted from the cassette by the guide pole and guide roller.
2. Similarly, the take-up loading ring also includes a slide ring and functions to wrap the tape about the head drum. Loading ring movement shifts the slide lever and pinch roller operation begins.

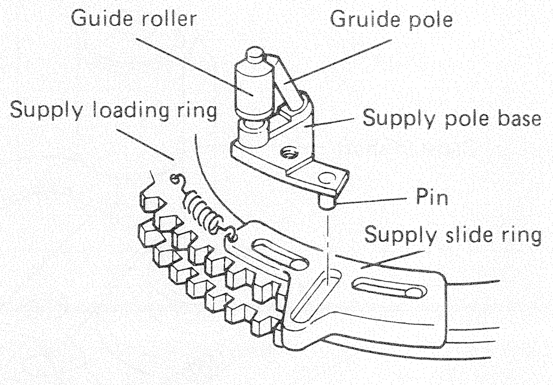
Guide roller
Gruide pole
Supply loading ring
Supply pole base
Pin
Supply slide ring

Fig. 2-5 Supply loading ring

2-3-4. Pinch roller

The take-up slide ring moves the slide lever toward the left, then with rotation of the take-up loading ring, spring-A moves the slide lever toward the right. This shifts the pinch roller arm assembly to where the pinch roller nearly contacts the capstan shaft. At this time, the eject lock mechanism is held in the locked position.

As the loading drive ring turns to about 1/6th of its travel, the pinch roller becomes nearly engaged.

Rotation ends at approximately the 90° position (AL switch on), at which time the pinch roller solenoid is switched on. Via the pinch roller lever and pinch roller arm assemblies, the pinch roller is pressed against the capstan shaft. Spring-C determines the pinch roller Pressure. See Fig. 2-7.

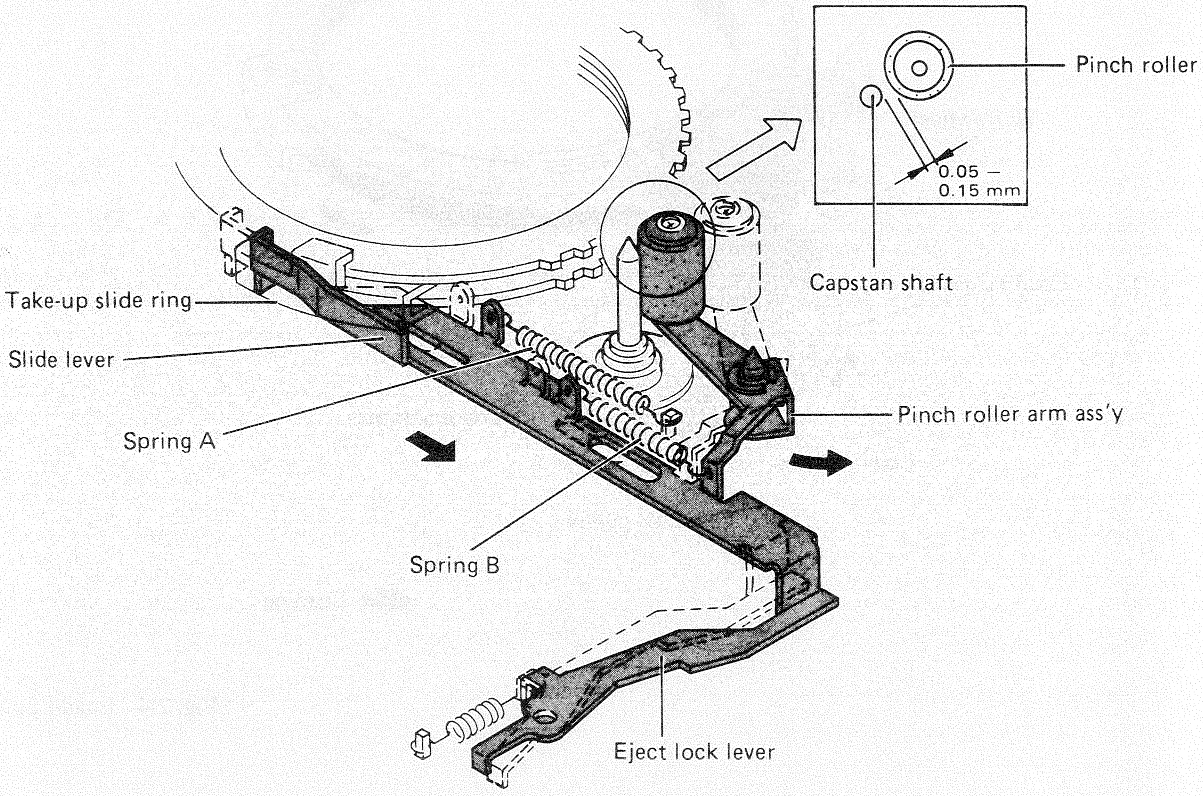
Pinch roller
0.05 – 0.15 mm
Capstan shaft
Take-up slide ring
Slide lever
Spring A
Pinch roller arm ass'y
Spring B
Eject lock lever

Fig. 2-6 Pinch roller operation-1

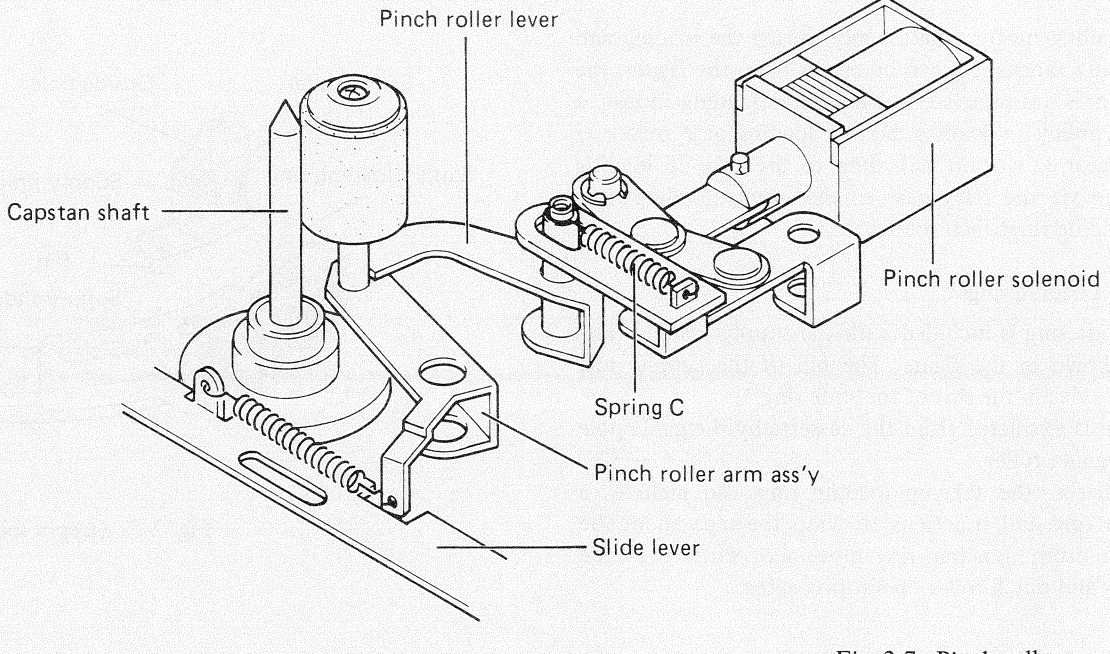
Pinch roller lever
Capstan shaft
Pinch roller solenoid
Spring C
Pinch roller arm ass'y
Slide lever

Fig. 2-7 Pinch roller operation-2

2-3-5. Back tension and tension brakes

As the supply pole base shifts in the loading direction, the tension pole is brought to position A (Fig. 2-8). Rotation of the take-up loading ring (lower side) engages the cancel lever with the loading ring stud, releasing the tension arm lock. A spring then shifts the tension arm fully toward the left.

This completes the loading operation, at which time the after loading plate sets the AL switch on and the pinch roller solenoid is energized. The solenoid plunger operates pinch slide plate, skew lever, slide plate and skew arm to apply back tension. After loading plate is moved by the cancel lever, and the tension brake lever rotates to release the tension brakes. See Figs. 2-8 and 2-9.

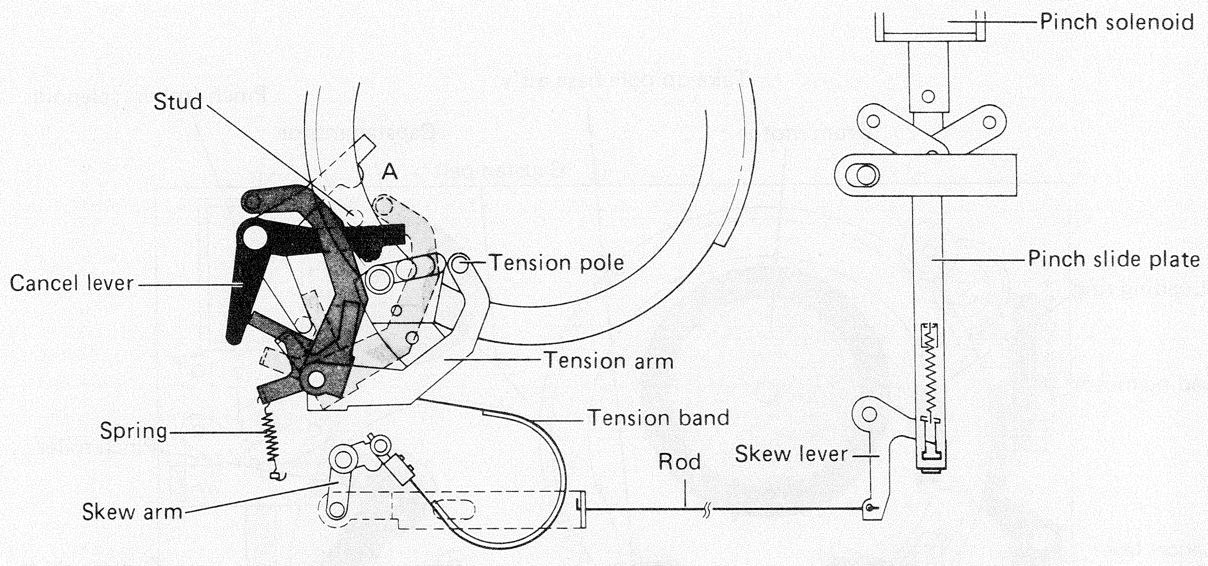
Pinch solenoid
Stud
A
Tension pole
Cancel lever
Pinch slide plate
Tension arm
Tension band
Spring
Rod
Skew lever
Skew arm

Fig. 2-8 Back tension

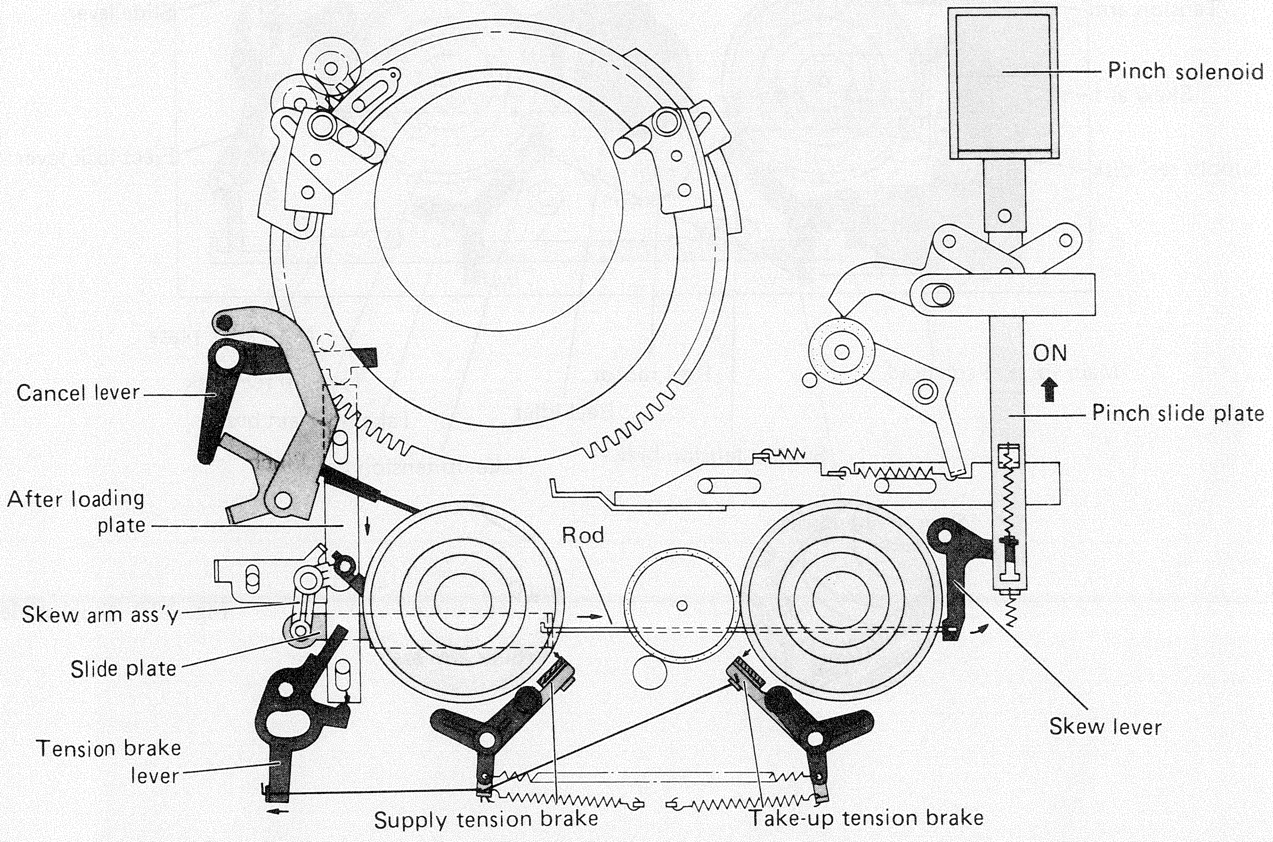
Pinch solenoid
ON
Cancel lever
Pinch slide plate
After loading plate
Rod
Skew arm ass'y
Slide plate
Skew lever
Tension brake lever
Supply tension brake
Take-up tension brake

Fig. 2-9 Tension brake

2-4. MODE DESCRIPTIONS

2-4-1. Stop mode

In the stop mode, no operations are being initiated.
The idler assembly is stopped and held in the neutral position and does not contact either reel disk.

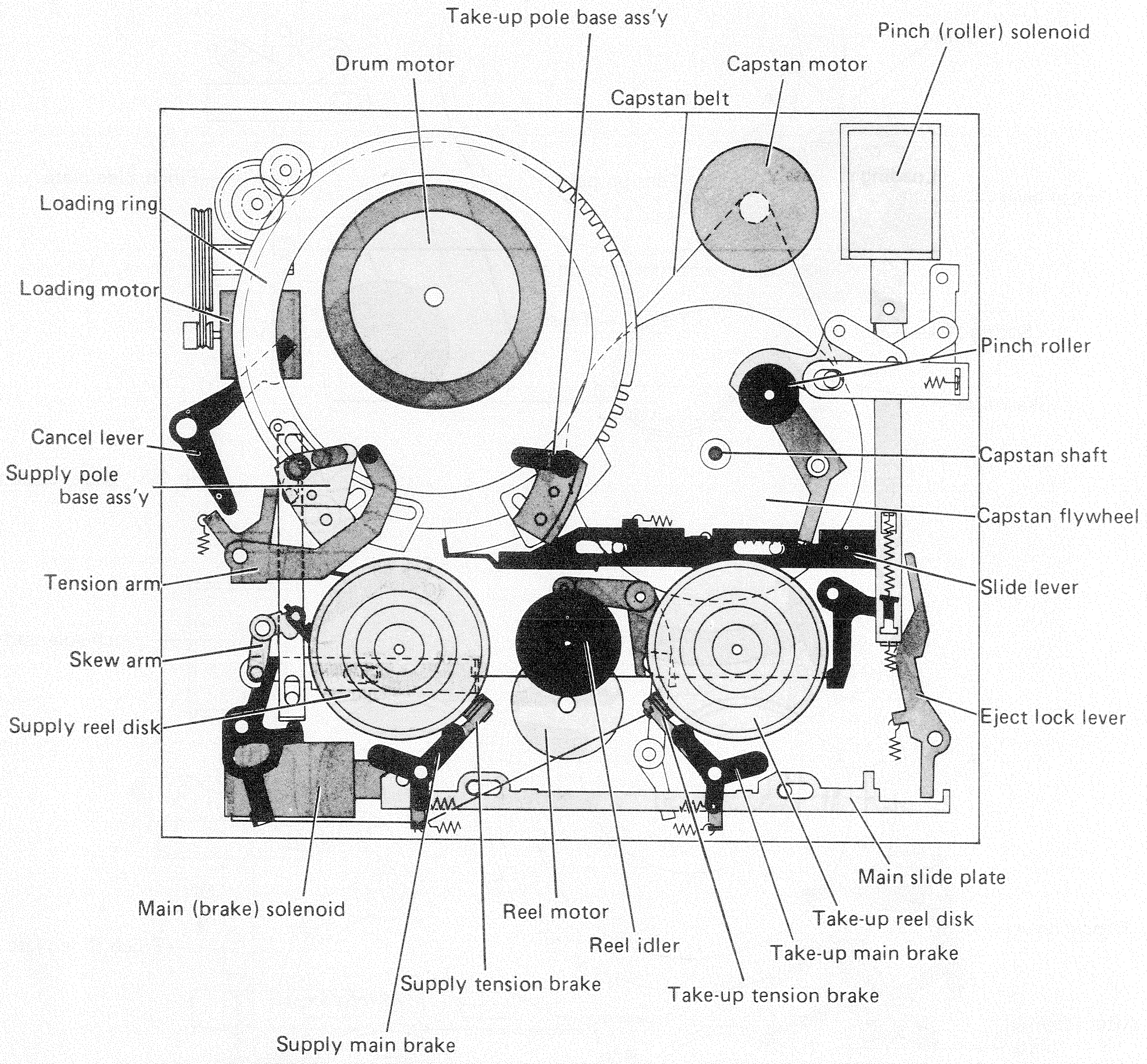
Take-up pole base ass'y
Pinch (roller) solenoid
Drum motor
Capstan motor
Capstan belt
Loading ring
Loading motor
Pinch roller
Cancel lever
Supply pole base ass'y
Capstan shaft
Capstan flywheel
Tension arm
Slide lever
Skew arm
Supply reel disk
Eject lock lever
Main slide plate
Main (brake) solenoid
Reel motor
Take-up reel disk
Reel idler
Take-up main brake
Supply tension brake
Take-up tension brake
Supply main brake

Fig. 2-10 Stop mode

2-4-2. Loading and unloading

1. Loading mode

Clockwise rotation of the reel motor begins when the PLAY button is pressed. The main solenoid operates and releases the main brakes. When the brake switch closes, the reel motor stops, then the drum, capstan and loading motors begin rotating. A brief clockwise rotation of the reel motor shifts the idler assembly to where it contacts the take-up reel disk assembly. This also ensures proper seating of the cassette internal reels on the reel disks.

As the loading motor rotates, the pole bases of the loading ring assembly gradually extract the tape from the cassette. The supply pole base also moves and the tension arm assembly shifts to the cancel lever position. Rotation of the take-up loading ring assembly releases the slide lever which then moves toward the right. Via the pinch roller arm assembly, the pinch roller becomes positioned 0.05 to 0.15 mm from the capstan shaft.

The slide lever locks the eject lock lever, which in turn locks the cassette housing is locked by both the main slide plate and the slide lever. (See 2-3-1 and 2-3-4.)

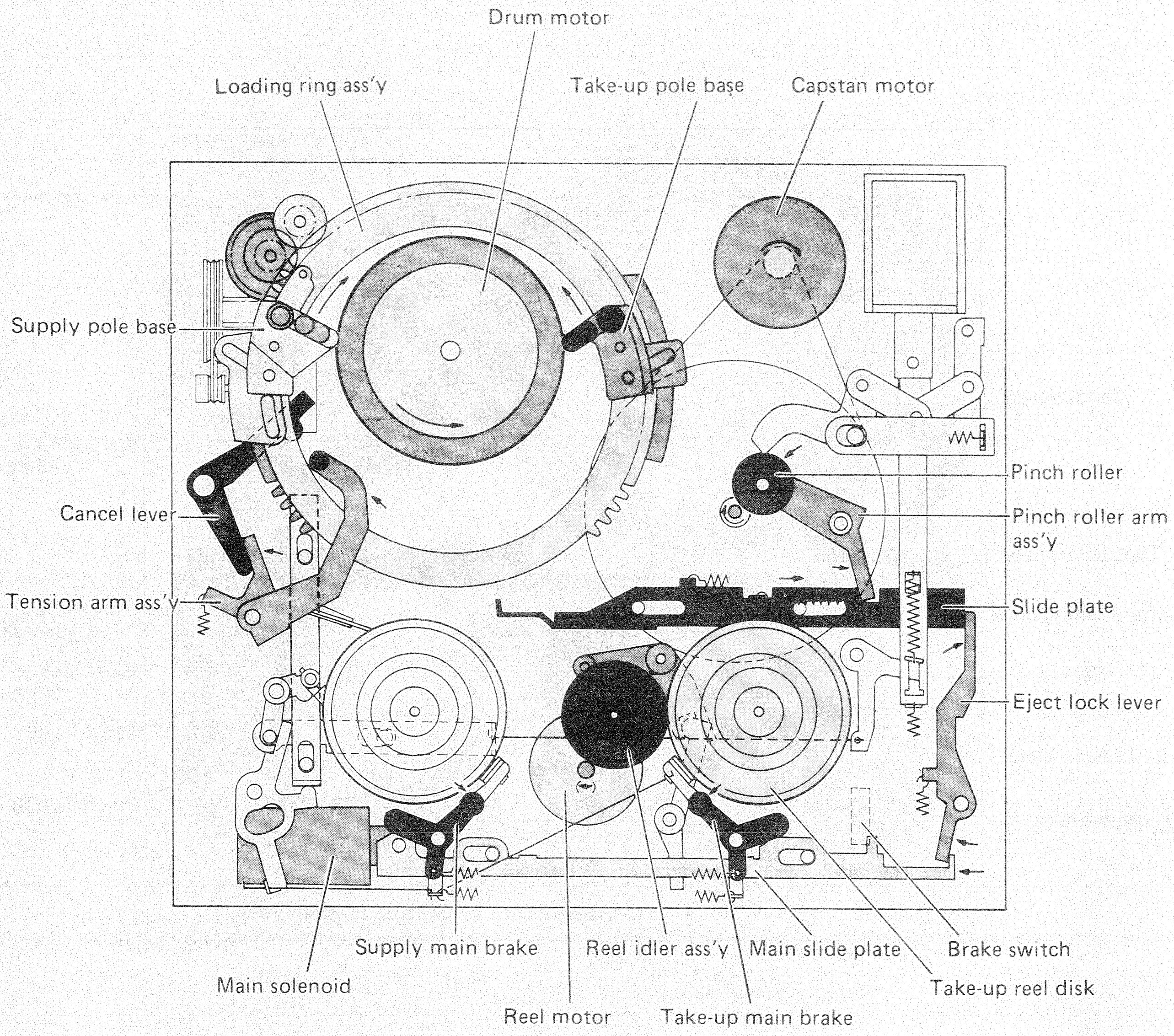
Drum motor
Loading ring ass'y
Take-up pole base
Capstan motor
Supply pole base
Pinch roller
Pinch roller arm ass'y
Cancel lever
Tension arm ass'y
Slide plate
Eject lock lever
Supply main brake
Reel idler ass'y
Main slide plate
Brake switch
Main solenoid
Take-up reel disk
Reel motor
Take-up main brake

Fig. 2-11 Loading mode

2. Unloading mode

During the play mode, pressing the STOP button stops the capstan motor and releases the main solenoid. The main brakes are applied to the reel disks and the idler returns to the neutral position. Release of the main solenoid switches off the brake switch and releases the pinch solenoid, separating the pinch roller from the capstan shaft. Via the rod, the skew arm moves to separate the tension band from the supply reel disk.

At this time, the skew lever sets the pinch switch off, the reel motor turns counter-clockwise and the main solenoid again functions to release the main brakes. Idler rotation is then applied to the supply reel disk. When the main solenoid operates, the brake switch closes and the loading motor begins rotating to initiate the unloading mode. As the loading ring starts turning, the cancel lever and after loading plate return to original positions. The tension arm is returned by the cancel lever and the after loading plate applies braking to the reel disks via the tension brake lever and the tension brakes. At a point just before completion of unloading, the slide lever starts to return to its original position, causing a large displacement of the pinch roller arm. Unloading is complete when the UL switch closes and the loading motor stops.

At completion of unloading, the reel motor stops, the main solenoid is released and the idler returns to the neutral position.

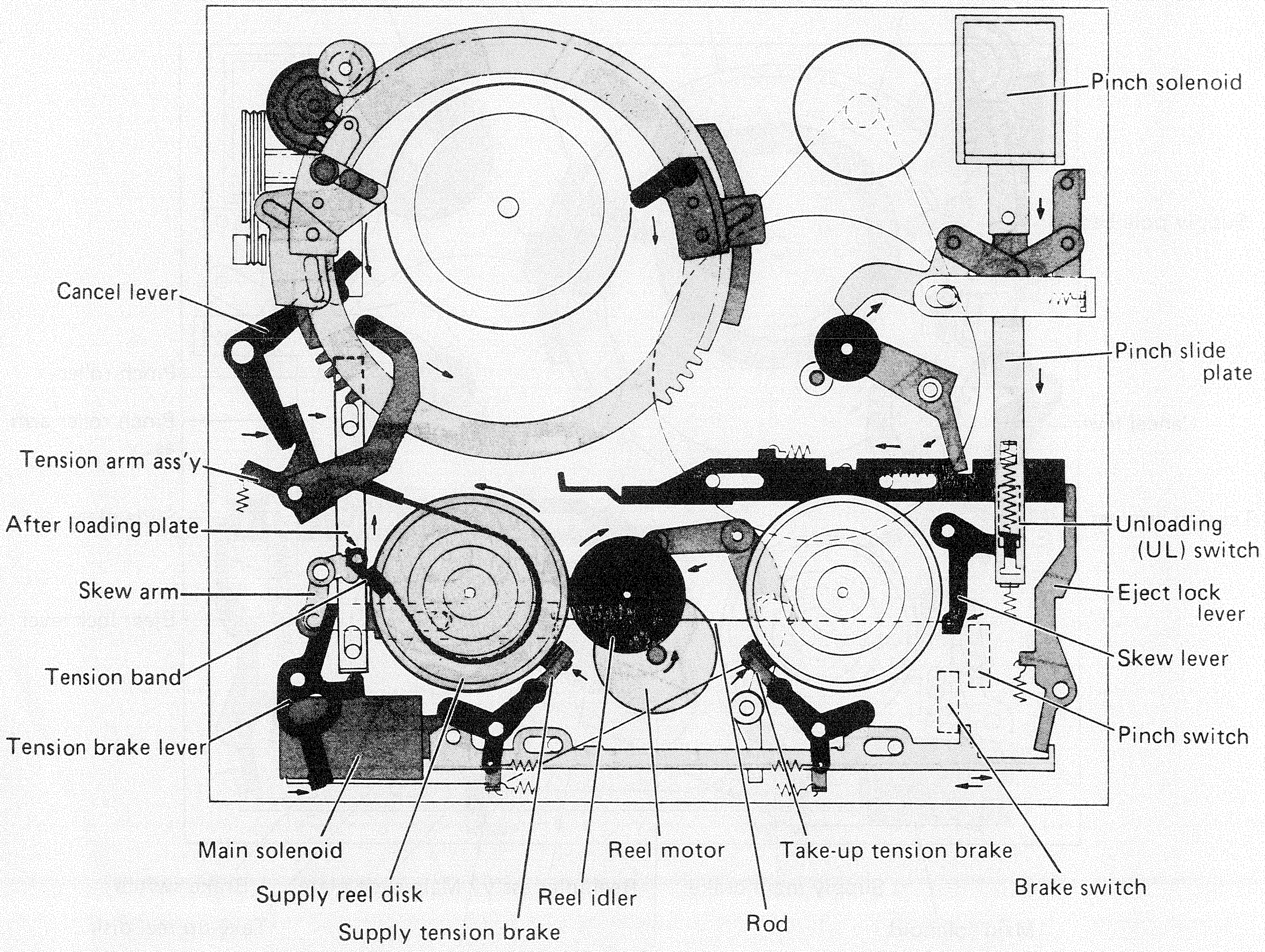
Pinch solenoid
Cancel lever
Pinch slide plate
Tension arm ass'y
After loading plate
Unloading (UL) switch
Skew arm
Eject lock lever
Skew lever
Tension band
Pinch switch
Tension brake lever
Main solenoid
Reel motor
Take-up tension brake
Brake switch
Supply reel disk
Reel idler
Rod
Supply tension brake

Fig. 2-12 Unloading mode

2-4-3. Play mode

1. Normal play mode

   Immediately before completion of loading, the stud below the take-up loading ring contacts the cancel lever and this presses the after loading plate. The cancel lever shifts the tension arm fully toward the left. After loading plate movement releases the tension brakes from the reel disks. When the after loading (AL) switch closes, the loading motor stops to complete loading.

   At this time, the pinch solenoid operates and the reel motor rotates clockwise. The pinch roller lever presses the pinch roller against the capstan shaft to initiate tape transport. The skew arm also moves to retain one end of the tension band.

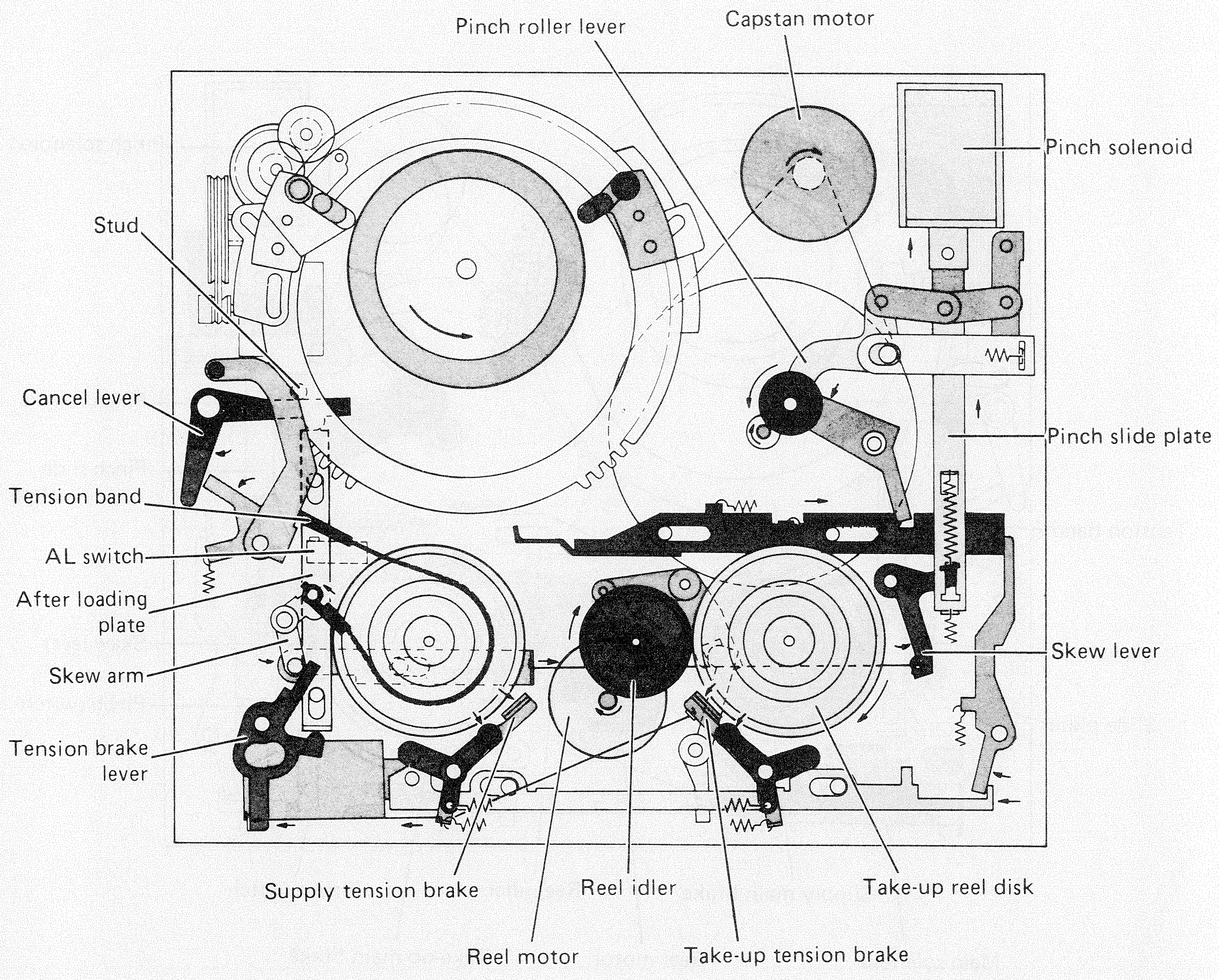
Pinch roller lever
Capstan motor
Pinch solenoid
Stud
Cancel lever
Tension band
AL switch
After loading plate
Skew arm
Tension brake lever
Pinch slide plate
Skew lever
Supply tension brake
Reel idler
Take-up reel disk
Reel motor
Take-up tension brake

Fig. 2-13 Normal play mode

2. Quick Finder CUE (Q-CUE)

In the play mode, while the Q-CUE button is held depressed, release of the pinch solenoid separates the pinch roller from the capstan shaft and the tension band from the supply reel disk. The pinch switch opens and the reel motor speed increases. This produces the Q-CUE mode in which the tape is transported by the take-up reel, instead of the capstan and pinch roller.

Releasing the Q-CUE button disengages the main solenoid and the reel motor stops. The reel idler separates from the take-up reel disk and the main brakes briefly stop the reel disks. The brake switch is switched off and the reel motor rotates, and after about 150 msec the main solenoid sets the brake switch on. This operation shifts the reel idler to the take-up reel disk again. With the brake switch on, the pinch solenoid operates to press the pinch roller against the capstan shaft and secure the tension band. The normal play mode then resumes.

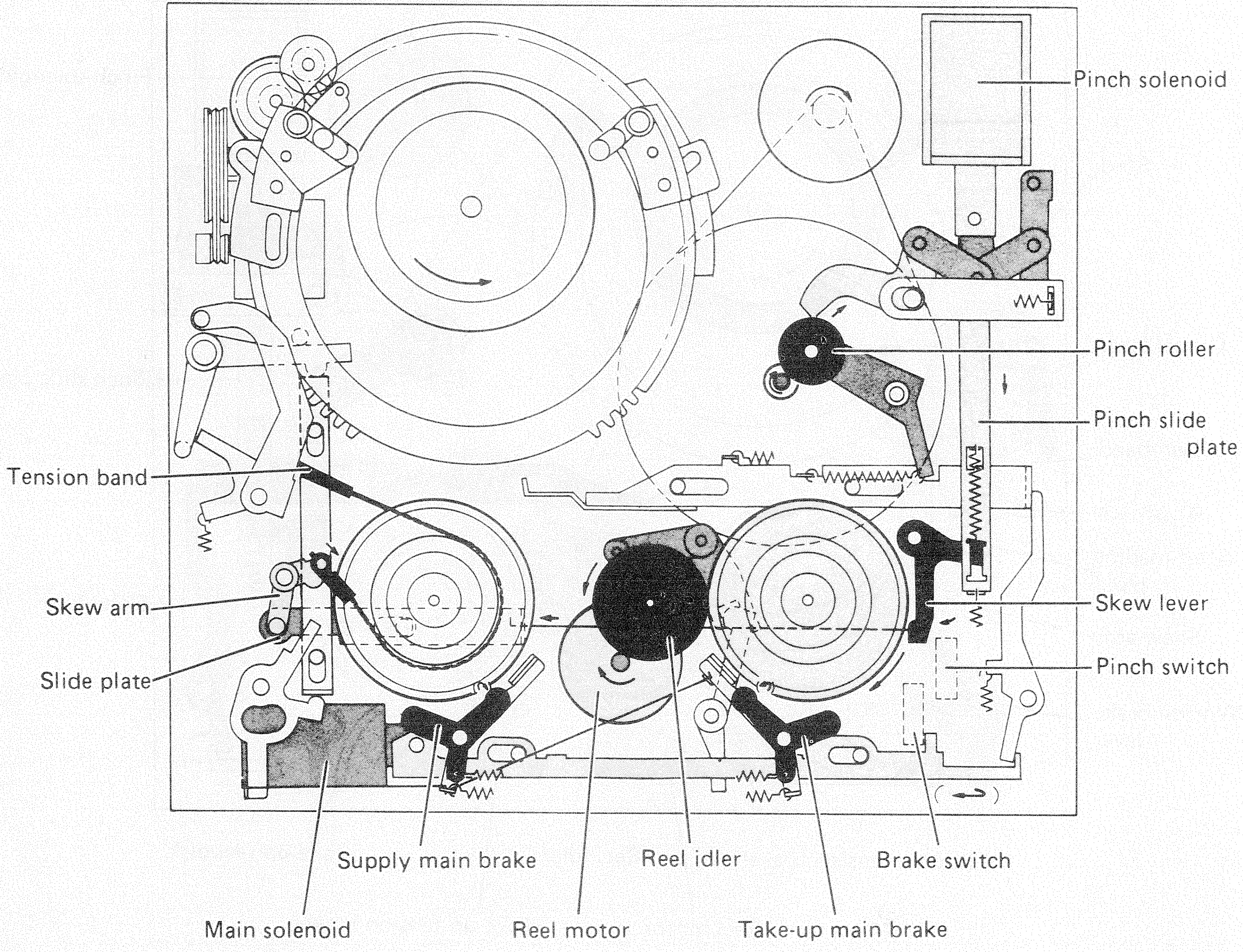
Pinch solenoid
Pinch roller
Pinch slide plate
Tension band
Skew arm
Skew lever
Slide plate
Pinch switch
Supply main brake
Reel idler
Brake switch
Main solenoid
Reel motor
Take-up main brake

Fig. 2-14 Quick Finder CUE

3. Quick Finder Review (Q-REVIEW)
   Holding the Q-REVIEW button depressed during the play mode releases the pinch and main solenoids. The pinch solenoid separates the pinch roller from the capstan shaft and the tension band from the supply reel disk. The pinch switch is then cut off.
   The main solenoid brakes the reel disks to stop rotation and cuts off the brake switch. After 150 msec, the main solenoid again switches the brake switch on. During this interval, the reel motor rotates counter-clockwise to shift the idler to the supply reel disk. This produces the Q-REVIEW mode. Operations after releasing the Q-REVIEW button are the same as for Q-CUE release.
4. Slow and still modes
   Mechanically, these are the same as the play mode except for the different rotation rates of the capstan motor.
5. Pause mode
   During the recording mode, pressing the PAUSE/STILL button releases the pinch and main solenoids. The pinch roller separates from the capstan shaft, tape transport stops and with the pinch switch off, the reel motor stops. At this time, the main solenoid applies brakes to the reel disks and the idler separates to yield the pause mode.
   The pause mode is released by again pressing the PLAY button. Both main and pinch solenoids are energized. The main solenoid releases the main brakes and the brake switch closes, after which the reel motor rotates clockwise. The reel idler then contacts the take-up reel disk. At this time the pinch roller contacts the capstan shaft and the tension band is secured. The recording mode then resumes.

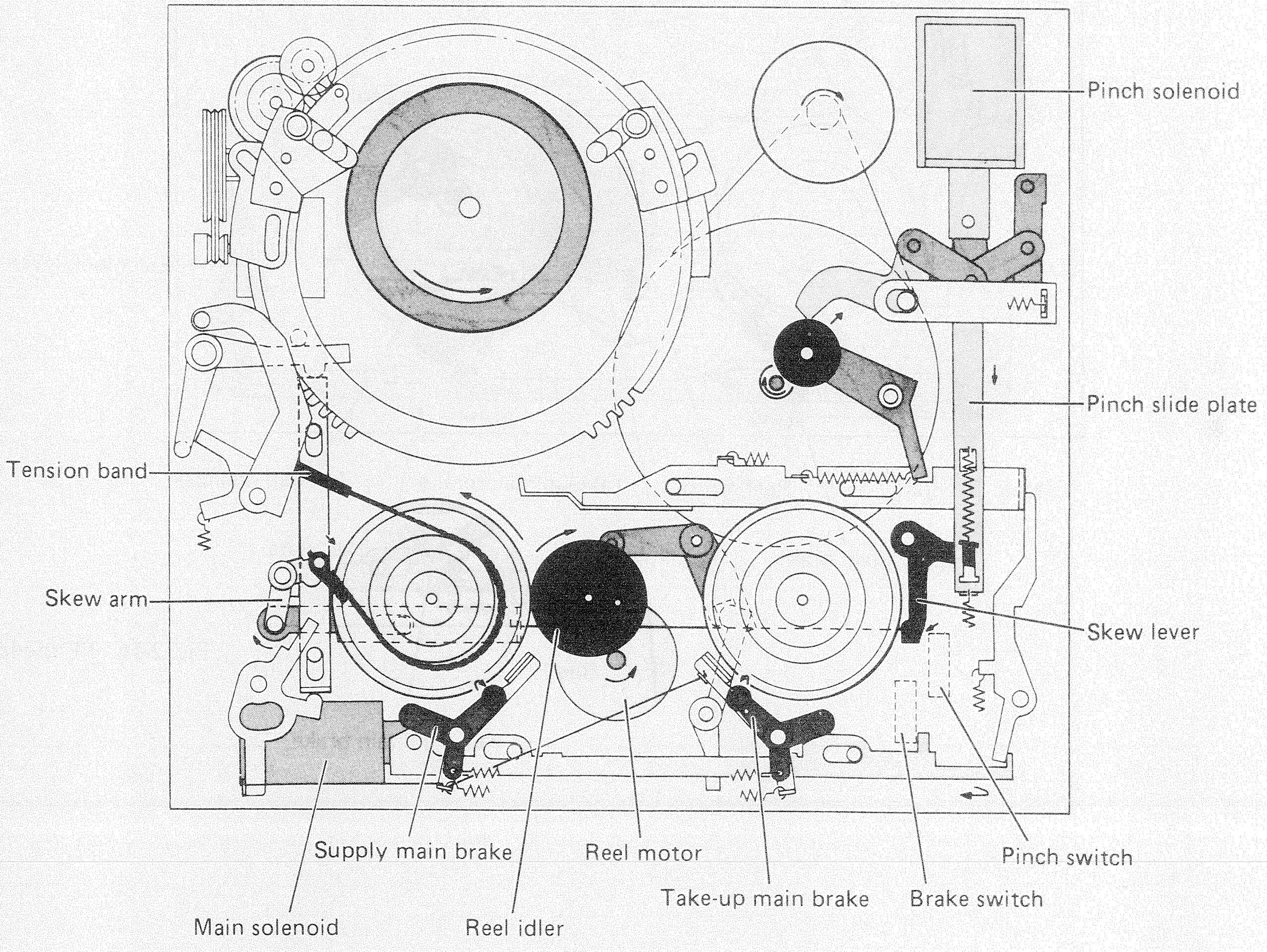

Fig. 2-15 Quick Finder Review mode

2-4-4. Fast forward (FF) mode

When the FF button is pressed, the reel motor rotates clockwise. The main solenoid operates and the reel idler is applied to the take-up reel disk. At this time, the main brakes are released from the reel disks and the tape becomes transported in the fast forward mode.

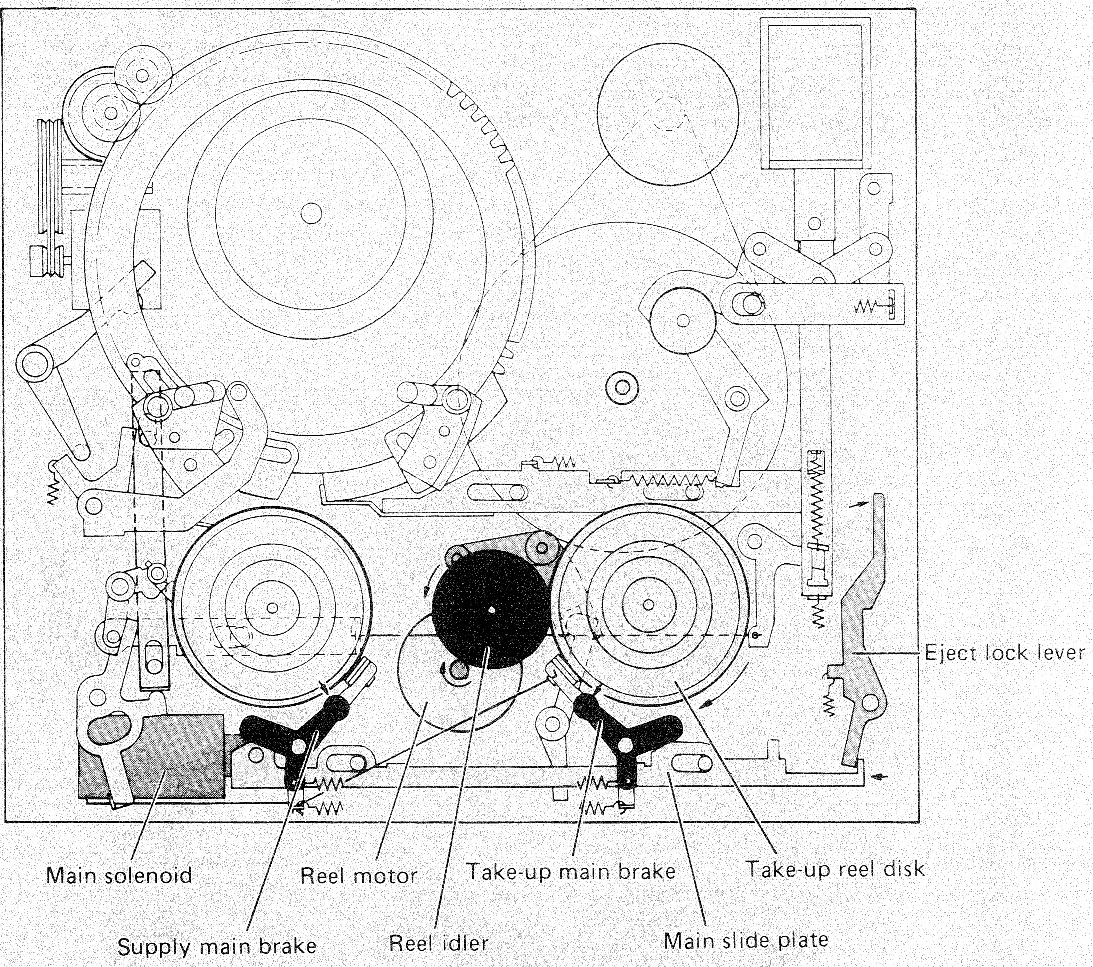
Eject lock lever
Main solenoid
Reel motor
Take-up main brake
Take-up reel disk
Supply main brake
Reel idler
Main slide plate

Fig. 2-16 FF mode

2-4-5. Rewind (REW) mode

This is the same as the FF mode, except that the reel motor rotates counter-clockwise, and the reel idler is applied to the supply reel disk.

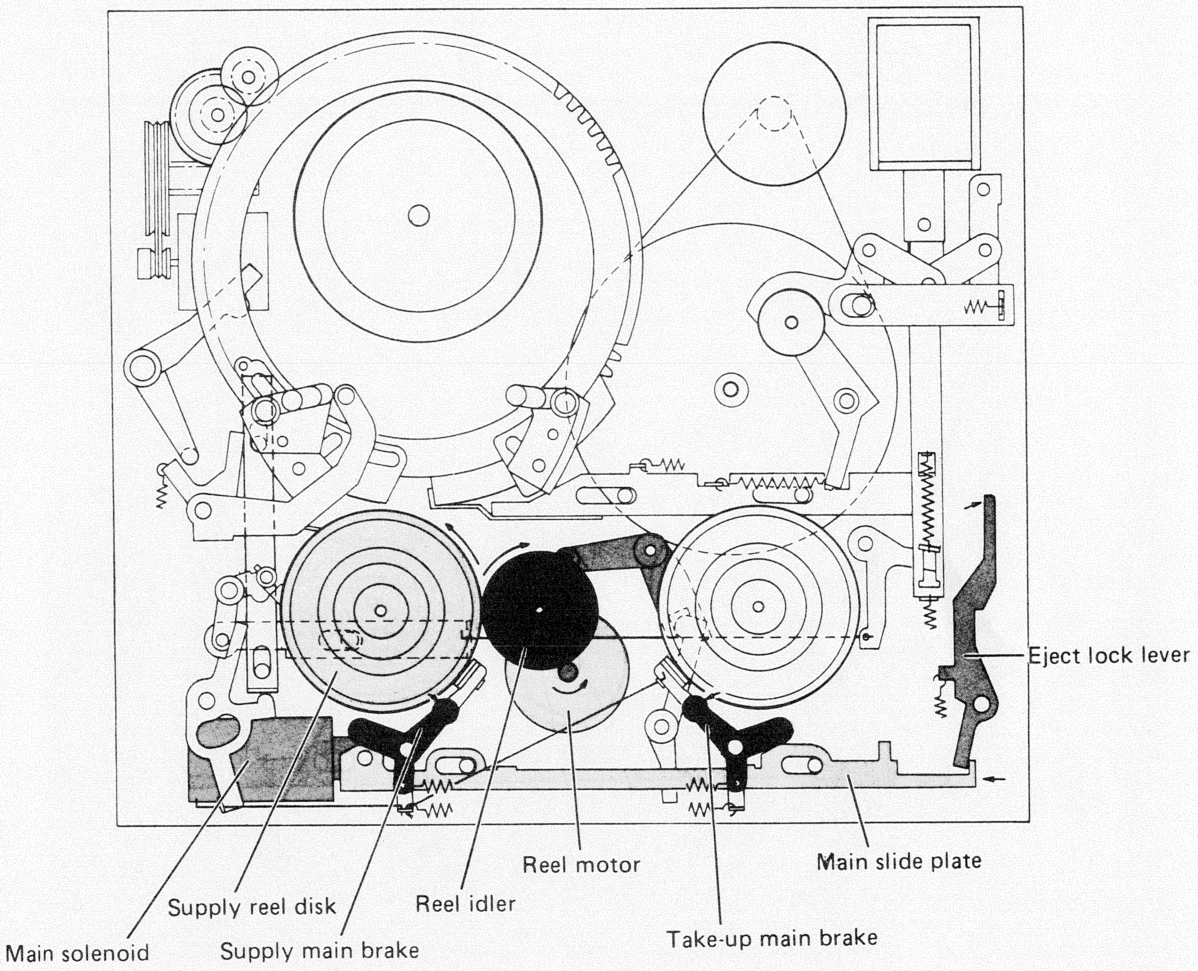
Eject lock lever
Reel motor
Main slide plate
Supply reel disk
Reel idler
Main solenoid
Supply main brake
Take-up main brake

Fig. 2-17 REW mode

SECTION 3

CIRCUIT DESCRIPTION

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3-1. GENERAL

The electronic circuits of this model are distributed among seven major circuits boards: preamplifier and recording amplifier (PRE/REC), luminance (Y), chrominance (CHROMA), audio and CPU, mechanism control (MECHACON), servo, and motor drive amplifier (MDA). In addition, the EG type includes a SECAM detector (S. DET) board. High compactness and reliability are achieved by the use of numerous integrated circuit (IC) devices.

3-2. VIDEO SYSTEM

3-2-1. Outline

Video signals are recorded and played back by using special rotary video heads. In the recording process, a bandpass filter (BPF) separates the chrominance (chroma) signal from the luminance (Y) signal. The luminance component is then frequency modulated, while the chroma component is converted to a low frequency centered on 627 kHz. Afterwards, the two signals are mixed and recorded on the tape.

During playback, filter networks again separate the luminance and chroma components. The FM luminance signal is demodulated and the chroma signal is returned to its normal spectral position. After going through automatic correction circuits, the signals are recombined in a form which can be viewed on a TV-monitor.

3-2-2. Luminance signal recording system

Signal inputs for recording consist of line, tuner and camera. If a video camera is connected, the camera signal has priority over the other inputs. The camera select circuit is composed of X1 to X3, D1, D2 and IC1 electronic switch.

The signal to be recorded is branched in two directions: one to the chroma processing circuit and the other to the AGC (automatic gain control) circuit at IC2 pin 12. This circuit functions to maintain a fixed signal level. Through X6 and lowpass filter LPF-1, the resulting luminance signal goes to the pre-processing circuit (pre-emphasis, clamping, white clip, etc.) of IC2.

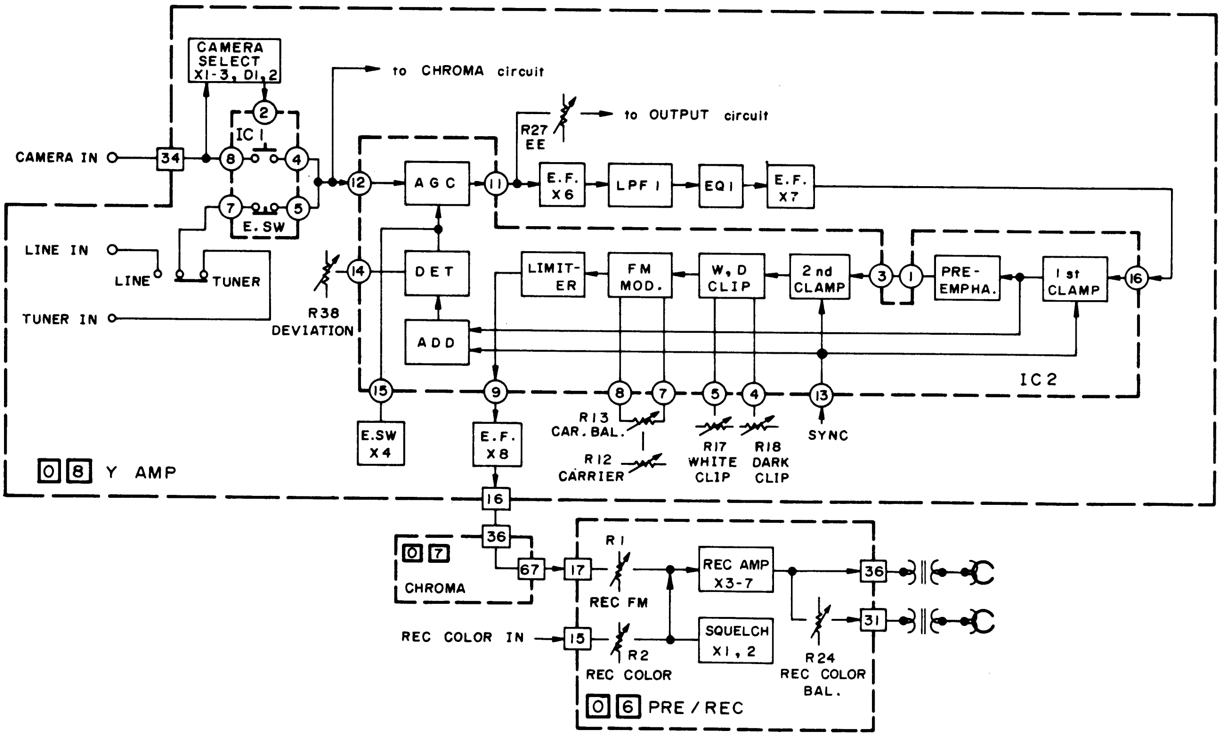

CAMERA SELECT X1-3, D1, 2
to CHROMA circuit
to OUTPUT circuit
R27 EE
IC 1
CAMERA IN
34
E.SW
LINE IN
LINE
TUNER
TUNER IN
AGC
E.F. X6
LPF 1
EQ 1
E.F. X7
DET
R38 DEVIATION
ADD
LIMITER
FM MOD.
W, D CLIP
2nd CLAMP
PRE-EMPHA.
1st CLAMP
IC2
E.SW X4
E.F. X8
R13 CAR. BAL.
R12 CARRIER
R17 WHITE CLIP
R18 DARK CLIP
SYNC
08 Y AMP
16
36
67
17
07 CHROMA
R1
REC FM
REC AMP X3-7
36
31
REC COLOR IN
15
R2 REC COLOR
SQUELCH X1, 2
R24 REC COLOR BAL.
06 PRE / REC

Fig. 3-1 Luminance signal recording system

Since pre-emphasis can cause overshoot in the areas of rapid signal level changes, the white and dark clip circuits are used to prevent over-modulation. The luminance signal is then frequency modulated and sent via emitter-follower X8 and the CHROMA board to the PRE/REC board.

At the PRE/REC board, the FM luminance signal is mixed with the converted chroma signal and applied to the video heads through recording amplifier X3 to X7.

3-2-3. Chroma signal recording system

Bandpass filter BPF-1 separates the chroma component from the video signal obtained from the Y amplifier. The ACC (automatic color control) circuit of IC2 stabilizes the chroma signal level. At the main converter, the 4.43 MHz subcarrier is converted by mixing with a 5.06 MHz signal supplied from the sub-converter. The outputs of the main converter become the sum and difference frequencies of both input signals. Lowpass filter LPF-3 passes only the difference frequency (627 kHz). The signal is then mixed with the luminance signal at the PRE/REC board and supplied to the video heads for recording.

3-2-4. Playback signal flow

Due to the slant azimuth recording system, each of the video heads produces an effective signal only when it traces its corresponding recorded tape track. Thus, as the head drum rotates, signals are obtained alternately from the heads. At the PRE/REC board, preamplifiers

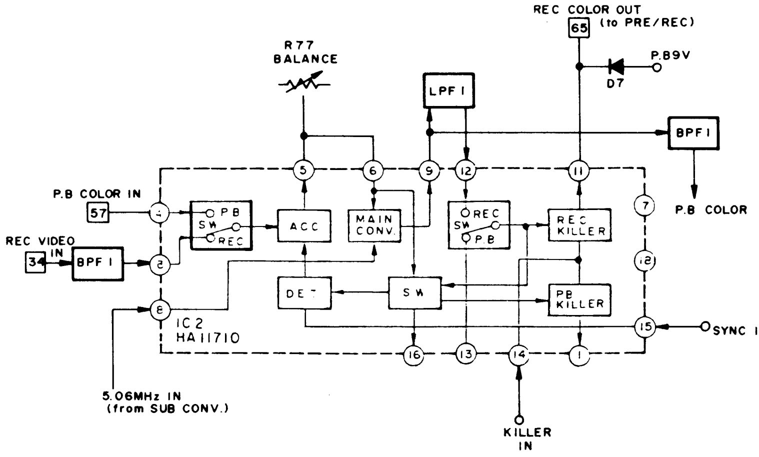

REC COLOR OUT
65
(to PRE/REC)
R77
BALANCE
P.B9V
D7
LPF I
BPF I
P.B COLOR
P.B COLOR IN
57
REC VIDEO IN
34
BPF I
PB
SW
REC
ACC
MAIN CONV.
REC
SW
P.B
REC KILLER
DET
SW
PB KILLER
IC 2
HA11710
SYNC IN
5.06MHz IN
(from SUB CONV.)
KILLER IN
5
6
9
12
11
4
2
8
7
12
15
16
13
14
1

Fig. 3-2 Chroma signal recording system

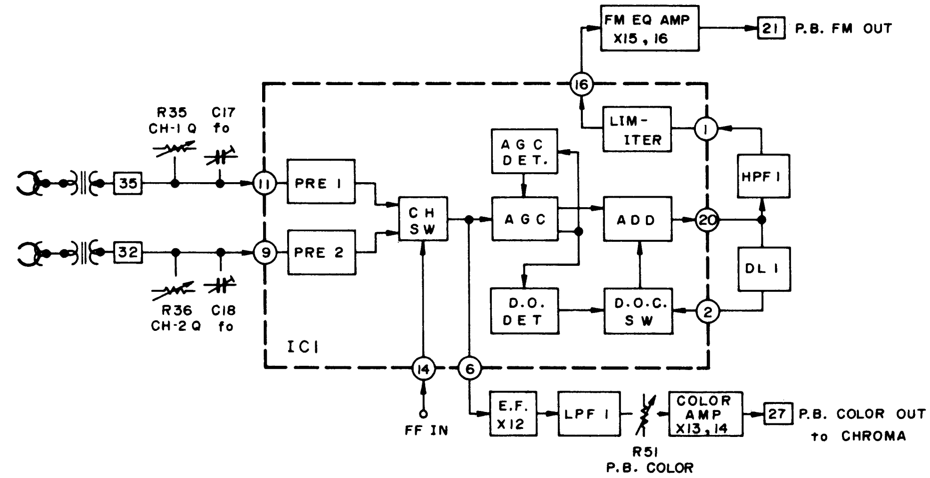

FM EQ AMP
X15, 16
21
P.B. FM OUT
R35
CH-1 Q
C17
fo
35
32
R36
CH-2 Q
C18
fo
PRE 1
PRE 2
CH SW
AGC DET.
AGC
D.O. DET
LIM-ITER
ADD
D.O.C. SW
HPF 1
DL 1
IC1
16
11
9
1
20
2
14
6
FF IN
E.F.
X12
LPF 1
COLOR AMP
X13, 14
27
P.B. COLOR OUT
to CHROMA
R51
P.B. COLOR

Fig. 3-3 Luminance and chroma signal playback system

PRE-1 and PRE-2 of IC1 amplify the FM signals, after which they are combined into a single continuous signal by switching in reference to a symmetrical squarewave (FF IN).

The recombined FM signal is branched in two directions. One of these goes to the FM AGC circuit, where a drop-out compensator (DOC) consisting of detector, switch and delay line DL-1 corrects for tape dropouts (transient loss of signal due to imperfections in the tape itself). The output of an adder circuit is applied to HPF-1 which eliminates the chroma signal. Via the FM equalizer, the resulting signal is sent to the luminance demodulator circuit of the Y board.

The other output of the FM channel switcher (CH SW in block diagram) goes via emitter-follower X12 to LPF-1. From the lowpass filter, the resulting 627 kHz chroma signal goes to color amplifier X13 and X14, then to the CHROMA board.

3-2-5. Luminance signal output

The playback FM signal from the PRE/REC board is routed via the CHROMA board to demodulator IC3 of the Y board. From the delay type demodulator, the demodulated signal goes through LPF-2 and EQ-2 to equalizing amplifier X9 and X10, where frequency response correction and de-emphasis are performed. In order to improve overall signal to noise ratio, the output is sent to the noise clip circuit of IC3, after which it is mixed with the playback chroma signal from the CHROMA board. The resulting signal then goes through a switching circuit to the output.

In the E-E (electric to electric) mode, the video signal from the AGC circuit is selected by a switching circuit and applied to the video amplifier of IC3. The vertical pulse mixing circuit of X13 is bypassed during E-E and normal playback modes. During shuttle search, slow, still and frame advance modes, the vertical pulse (50 Hz) is mixed with the video signal. Adding this pulse improves picture stability in these modes by compensating for noise interference with the vertical sync component of the playback picture.

One output of clamp circuit D4 and X14 goes via electronic switch X16 and emitter-follower X17 to the camera connector as the playback monitoring signal. In the E-E mode, this output is cut off by X16.

The other output is sent to emitter-follower X15, then to the VIDEO OUT connector as the video output signal. X15 also supplies the signal to the RF converter via EQ-3 and output amplifier X18 and X19.

3-2-6. Chroma signal playback

The playback color signal from the PRE/REC board is supplied to the ACC of IC2, which maintains the signal at a constant level. At the main converter, 5.06 MHz

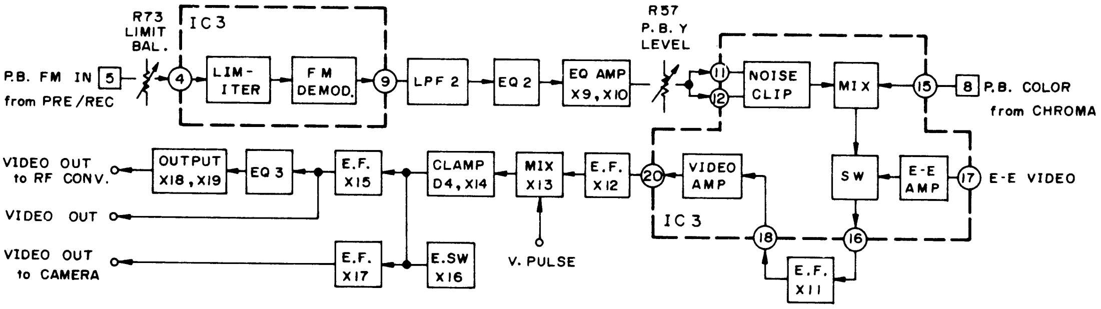

R73
LIMIT
BAL.
IC3
P.B. FM IN
5
from PRE/REC
4
LIM-
ITER
FM
DEMOD.
9
LPF 2
EQ 2
EQ AMP
X9,X10
R57
P.B. Y
LEVEL
11
12
NOISE
CLIP
MIX
15
8
P.B. COLOR
from CHROMA
VIDEO OUT
to RF CONV.
OUTPUT
X18,X19
EQ 3
E.F.
X15
CLAMP
D4,X14
MIX
X13
E.F.
X12
20
VIDEO
AMP
SW
E-E
AMP
17
E-E VIDEO
IC 3
VIDEO OUT
VIDEO OUT
to CAMERA
E.F.
X17
E.SW
X16
V. PULSE
18
16
E.F.
X11

Fig. 3-4 Luminance signal output and video output system

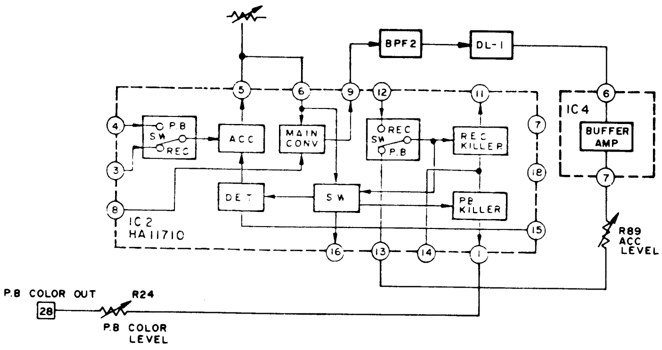

BPF2
DL-1
5
6
9
12
11
6
IC4
4
P.B
SW
REC
ACC
MAIN
CONV
REC
SW
P.B
REC
KILLER
7
BUFFER
AMP
3
18
7
DET
SW
PB
KILLER
8
IC2
HA11710
15
R89
ACC
LEVEL
16
13
14
1
P.B COLOR OUT
28
R24
P.B COLOR
LEVEL

Fig. 3-5 Chroma playback

obtained from sub converter IC3 is mixed with the chroma signal. Through BPF-2, the resulting 4.43 MHz chroma signal goes to delay line filter DL-1, which removes crosstalk and improves S/N.

Delay line DL-1 output first goes from IC4 buffer amplifier to IC2. From this point, it is branched in two lines, one of which re-enters IC4 and goes to the killer and phase detector circuits. The other output is routed via the playback killer circuit to the Y board, where it is mixed with the luminance signal to become the video output.

3-2-7. Automatic phase control (APC)

In the recording mode, the APC circuit does not operate and the VCO (voltage controlled oscillator) functions as a fixed oscillator to supply 4.43 MHz to IC3 sub-converter. At the same time, 627 kHz from the AFC loop is also applied to the sub-converter, yielding sum and difference frequencies which go to BPF-3. The band-pass filter passes only the 5.06 MHz sum component for use by the main converter.

Various mechanical and physical factors are encountered during playback. Differences in ambient temperature, tape to head contact, minute variations in head rotation, elasticity of the tape and other phenomena contribute to a frequency error (±Δf) with respect to the recorded signal. The APC and AFC loops therefore function to compensate for this error and provide an acceptable playback picture.

In the playback mode, the 627 kHz ±Δf from the ACC circuit is applied to the main converter. At the same time, 4.43 MHz from the VCO and 627 kHz from the AFC loop go to the sub-converter. The sum of these frequencies (5.06 MHz) is also sent to the main converter.

The 4.43 MHz ±Δf (difference frequency) component obtained from the main converter and BPF-2 is supplied to the phase detector and killer detector of IC4. Another 4.43 MHz signal from the crystal oscillator of IC3 is also applied to the phase detector via carrier amplifier-2. The phase detector compares the phases of these signals and produces an error voltage which goes to the VCO. Consequently, by varying the VCO output frequency in accordance with ±Δf, a stable 4.43 MHz output can be obtained from BPF-2.

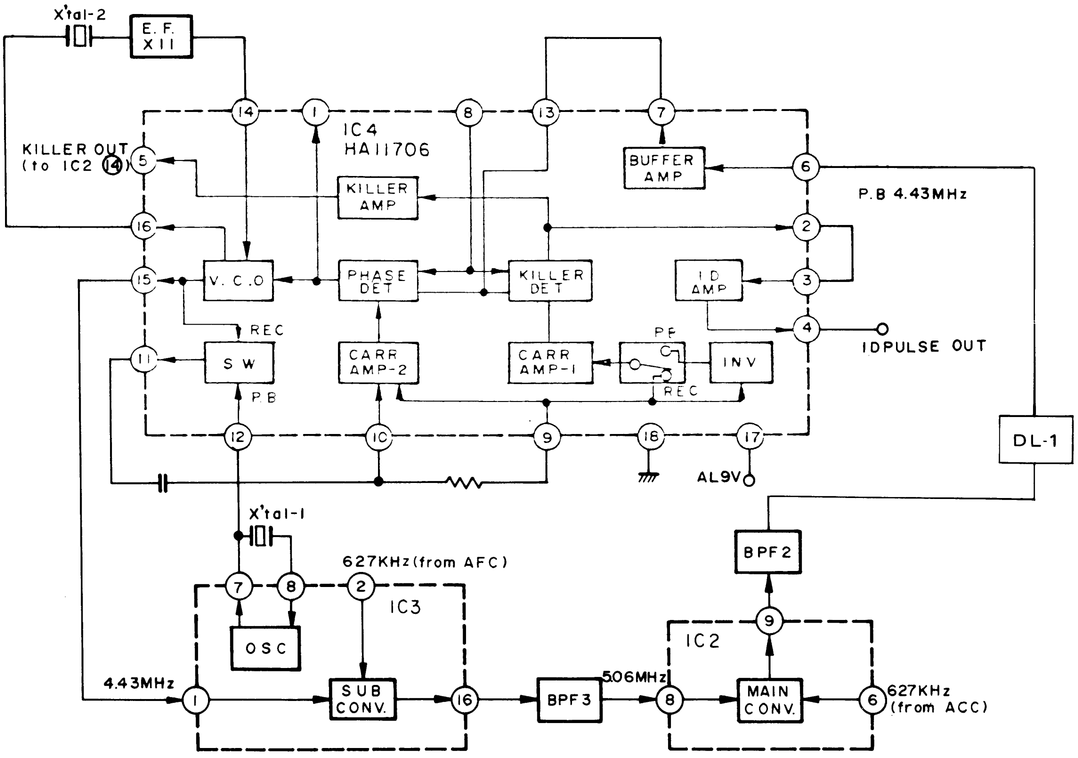

X'tal-2
E. F. X11
KILLER OUT (to IC2 ⑭)
IC4 HA11706
BUFFER AMP
P.B 4.43MHz
KILLER AMP
V. C. O
PHASE DET
KILLER DET
I D AMP
REC
S W
P.B
CARR AMP-2
CARR AMP-1
PF
INV
REC
IDPULSE OUT
DL-1
AL9V
X'tal-1
627KHz (from AFC)
IC3
OSC
SUB CONV.
4.43MHz
BPF 3
5.06MHz
IC2
BPF 2
MAIN CONV.
627KHz (from ACC)

Fig. 3-6 Automatic phase control (APC) system

3-2-8. Automatic frequency control (AFC)

The AFC loop functions in the same manner during both recording and playback. In the recording mode, the reference signal is the horizontal sync pulse of the input video signal, while the H. pulse component of the playback video signal in the playback mode.
A 40 fH color signal (40 x 15.625 kHz = approx. *625 kHz) is produced in this circuit.
Other functions of the AFC loop are phase control of the color signal ID pulse and compensation with respect to the input horizontal sync pulse.

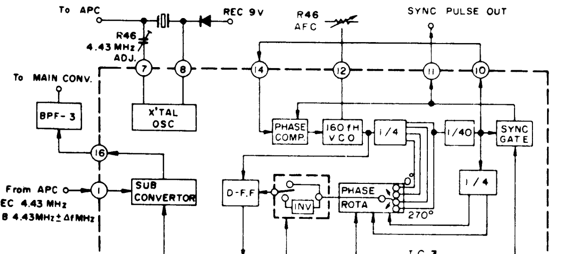


Fig. 3-7 Automatic frequency control (AFC) system

* In practice, 627 kHz is used in order to minimize externally introduced interference.

3-3. AUDIO SYSTEM

3-3-1. Outline

Four audio signal inputs are provided: microphone (MIC), camera, line (audio) and tuner. The MIC input has priority, then the CAMERA input. When a video camera is connected, electronic switch X6 functions from the camera mode signal sent from the Y board, cutting off line and tuner signals.

3-3-2. Audio recording

The signal from the MIC jack is supplied to the AGC circuit. This circuit includes an electronic switch which shorts the input line during the playback mode. Control of the AGC circuit is performed by voltage rectified (D5 and D6) from the line output amplifier of IC2. The output of the AGC circuit goes to the amplifier of IC1.
One output of the IC1 amplifier is sent to the recording amplifier of IC2 via an electronic switch and R43 (REC LEVEL). This signal is mixed with AC bias and applied to the audio REC/PB head. Recording bias is an approx. 70 kHz signal from L4 through R81 (AC BIAS). Transistors X12 and X13 comprise the push-pull type bias oscillator, which is controlled by X14, D12, D13 and D14. The L4 output is applied to the full erase, audio erase and audio heads. Audio head switching is performed by electronic switches X1, X2, X3 and X5.
The other IC1 amplifier output goes to the IC2 output amplifier. From this point, the signal is sent to the AGC detector and audio output connectors: AUDIO OUT, EARPHONE OUT, CAMERA CONNECTOR and RF OUT through the RF converter.

3-3-3. Audio playback

Via an electronic switch, the playback signal goes to the preamplifier of IC1. After further amplification in IC1, the signal is sent to the output amplifier. Following operations are the same as for the recording mode.
A muting circuit composed of X11, X31 and D4 mutes the output signal during the still, frame advance, slow and shuttle search modes.

3-3-4.. Audio dubbing

Audio dubbing is performed with the video signal in the playback mode and the audio circuit in the recording mode. At this time, X15 and relay RL1 cut off the L4 erase signal from the full erase head.

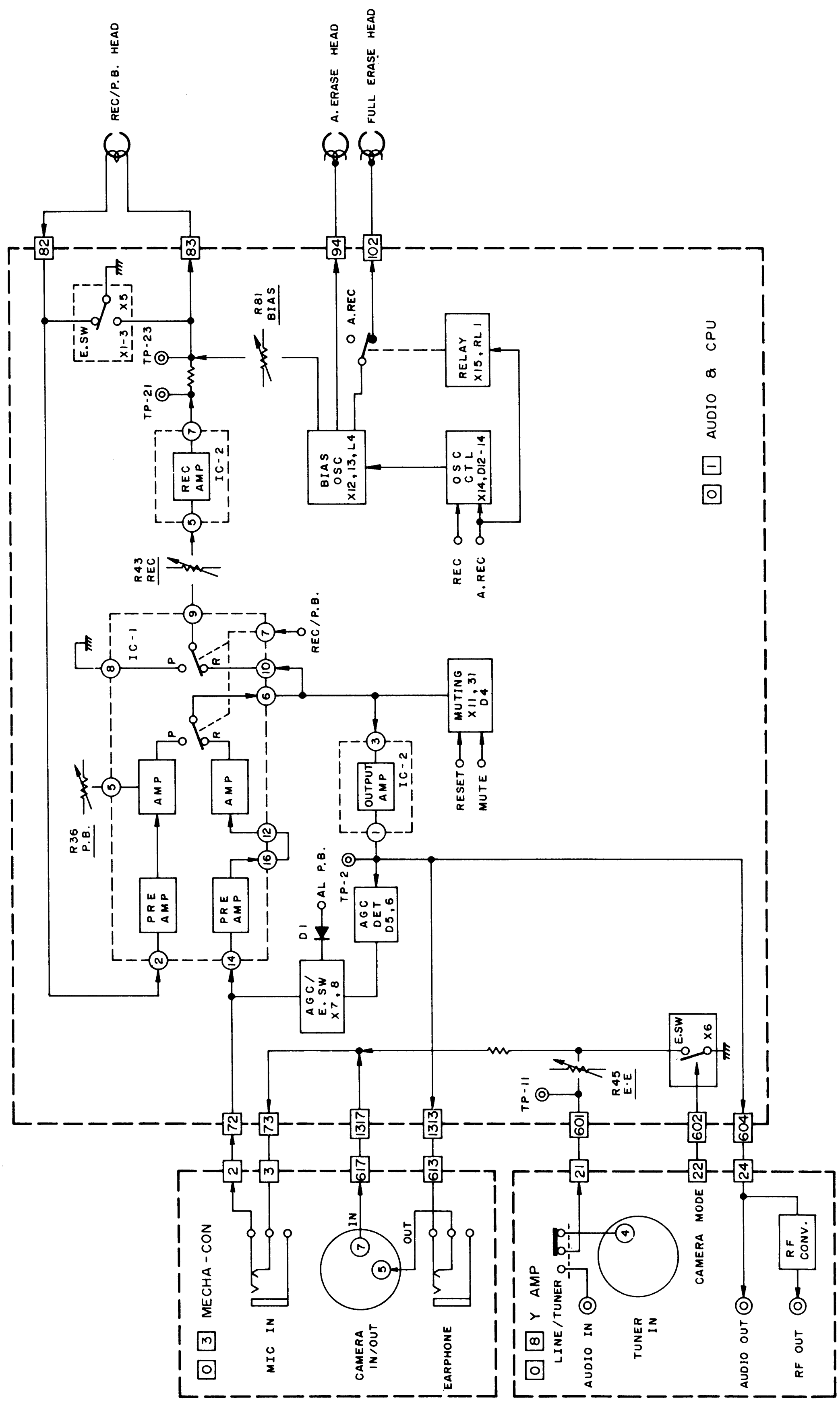

REC/P.B. HEAD
A. ERASE HEAD
FULL ERASE HEAD
82
83
94
102
E.SW
X1-3
X5
TP-23
TP-21
R81
BIAS
A.REC
RELAY
X15, RL1
REC AMP
IC-2
BIAS OSC
X12, 13, L4
OSC CTL
X14, D12-14
REC
A.REC
O 1 AUDIO & CPU
R43
REC
IC-1
REC/P.B.
P
R
AMP
AMP
MUTING
X11, 31
D4
RESET
MUTE
OUTPUT AMP
IC-2
R36
P.B.
PRE AMP
PRE AMP
TP-2
AL P.B.
D1
AGC DET
D5, 6
AGC/
E.SW
X7, 8
E.SW
X6
TP-11
R45
E-E
72
73
1317
1313
601
602
604
2
3
617
613
21
22
24
O 3 MECHA-CON
MIC IN
CAMERA
IN/OUT
IN
OUT
EARPHONE
O 8 Y AMP
LINE/TUNER
AUDIO IN
TUNER
IN
CAMERA MODE
RF CONV.
AUDIO OUT
RF OUT

Fig. 3-8 Audio system

3-4. MECHANISM CONTROL (MECHACON) CIRCUIT

3-4-1. Outline

The mechanism control circuit is distributed mainly among the MECHACON, AUDIO & CPU and SERVO boards. It functions to correlate the electrical and mechanical operations of the machine, set up the selected operating modes, and interlock the systems in such a manner that damage to the machine and tape is prevented in event of user error. The main functional component of the mechacon circuit of this model is a one-chip 4-bit microcomputer.

3-4-2. Switch locations

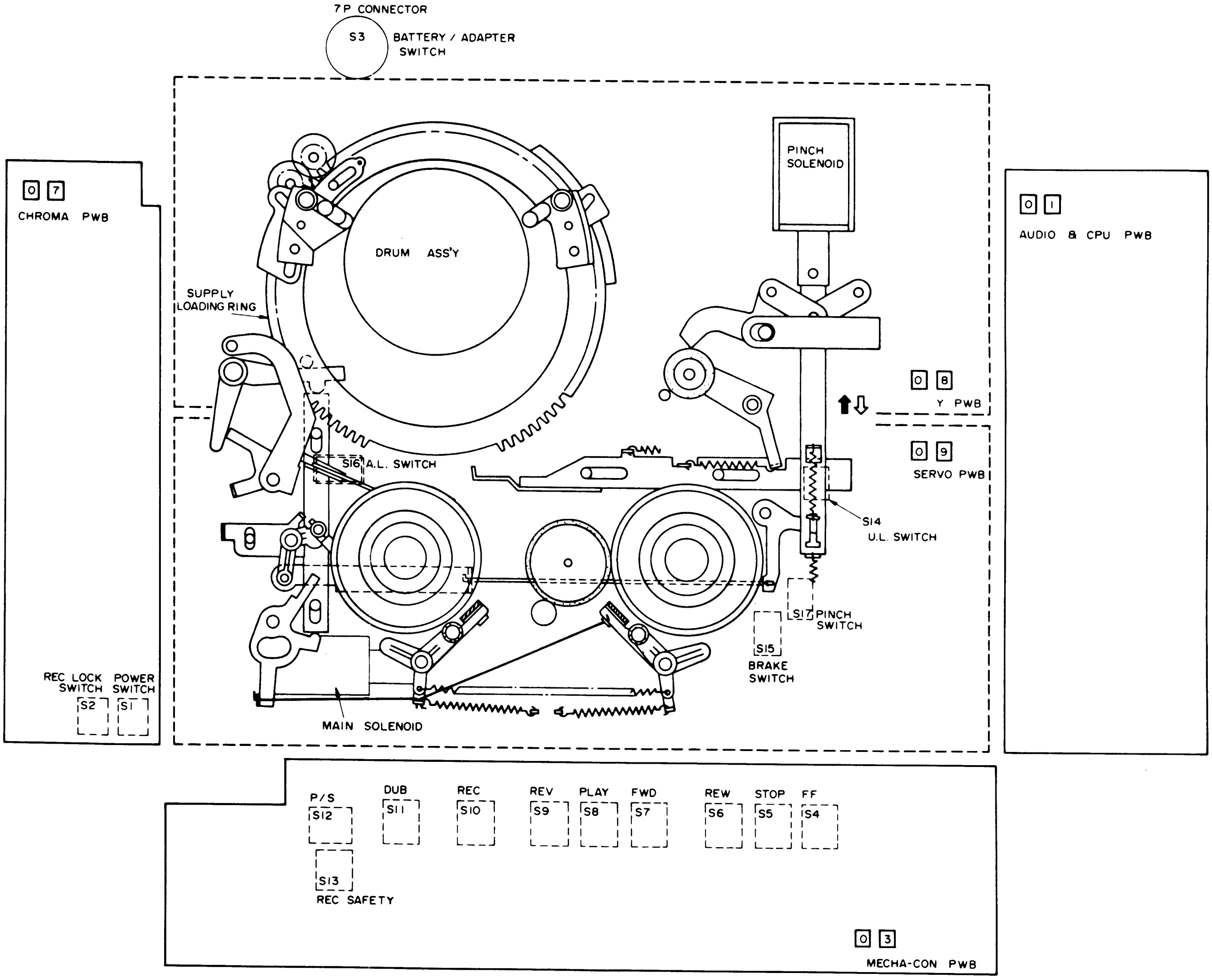

7P CONNECTOR
S3
BATTERY / ADAPTER SWITCH
07
CHROMA PWB
PINCH SOLENOID
01
AUDIO & CPU PWB
DRUM ASS'Y
SUPPLY LOADING RING
08
Y PWB
09
SERVO PWB
S16 A.L. SWITCH
S14
U.L. SWITCH
S17 PINCH SWITCH
S15
BRAKE SWITCH
REC LOCK SWITCH
POWER SWITCH
S2
S1
MAIN SOLENOID
P/S
S12
DUB
S11
REC
S10
REV
S9
PLAY
S8
FWD
S7
REW
S6
STOP
S5
FF
S4
S13
REC SAFETY
03
MECHA-CON PWB

Fig. 3-9 Switch functions

Switch		Timing of operation	Function
No.	Name		
S1	Power	POWER button pressed	Switch for power supply to unit.
S2	REC lock	REC LOCK button pressed	Switch for automatic recording.
S3	AC/Battery	Tuner/adapter connector (7 pin) inserted	Selects internal battery and external power supply (tuner or adapter).
S4	FF	FF button pressed	Selects indicated mode.
S5	Stop	STOP button pressed	Selects indicated mode.
S6	Rew.	REW button pressed	Selects indicated mode.
S7	Forward	Q-CUE button held depressed	Selects indicated mode.
S8	Play	PLAY button pressed	Selects indicated mode.
S9	Review	Q-REVIEW button held pressed	Selects indicated mode.
S10	Rec.	PLAY and REC buttons pressed	Selects indicated mode.
S11	A. dub.	PLAY and AUDIO DUB buttons pressed	Selects indicated mode.
S12	Pause/Still	PAUSE/STILL button pressed	Selects indicated mode.
S13	Rec. safety	Cassette presses rec. safety pawl.	Detects cassette rec. safety tab.
S14	U.L.	Switched on by slide lever when T.U. loading ring returns in unloading.	Detects presence of tape in the cassette.
S15	Brake	ON when main solenoid operates.	Detects status of main solenoid.
S16	A.L.	ON by A.L. plate when T.U. loading ring moves cancel lever after loading.	Detects loading mode complete.
S17	Pinch	ON when pinch roller solenoid operates.	Detects status of pinch roller solenoid.

Table 3-1 Switch functions

3-4-3. Circuit operations

1. Power on state
   1) STOP LED lights.
   2) The Stop mode is produced.
   3) If tape is loaded, unloading is performed, then the Stop mode produced.

2. Mode priorities
   1) Button operatios are shown in the Mode shift table (Table 3-2). Generally, a desired mode can be selected directly from a mode in progress.
   2) If two or more buttons are pressed simultaneously, the following priority applies: STOP – REC – DUB – PLAY – FF – REW – PAUSE/STILL.
   3) Quick Finder CUE and REVIEW are enabled only during the Play, Still and Slow modes. These are performed while the Q-CUE or Q-REVIEW button is held depressed.
   4) Simultaneously pressing the Q-CUE and Q-REVIEW buttons yields the Play mode.
   5) The following combined button operations are enabled: REC + PLAY; REC + PAUSE/STILL; AUDIO DUB + PLAY; AUDIO DUB + PAUSE/STILL.

Button operation Current mode	STOP	PLAY	F.F.	REW	PLAY +REC	PLAY +DUB	P/S +REC	P/S +DUB	FWD	REV	PAUSE /STILL	SLOW	FRAME ADV
STOP		○	○	○	○	○	○	○	X	X	X	X	X
PLAY	○		○	○	○	○	○	○	○	○	○ STILL	○	X
F.F.	○	○		○	○	○	○	○	X	X	X	X	X
REW	○	○	○		○	○	○	○	X	X	X	X	X
REC	○	X	X	X		X	○	X	X	X	○ REC PAUSE	X	X
DUB	○	X	X	X	○		○	○	X	X	○ DUB PAUSE	X	X
REC PAUSE	○	○ REC	X	X	○	X		○	X	X		X	X
DUB PAUSE	○	○ DUB	X	X	○	○	○		X	X		X	X
FWD	○	○	○	○	○	○	○	○		X	○ STILL latch	○ SLOW latch	X
REV	○	○	○	○	○	○	○	○	○		○ STILL latch	○ SLOW latch	X
STILL	○	○	○	○	○	○	○	○	○	○		○	○
SLOW	○	○	○	○	○	○	○	○	○	○	○		X

○ : Enabled X : Inhibited (Current mode maintained)

Table 3-2 Mode shift table

3. Stop mode entry
   1) The Stop mode is entered automatically at tape end and tape start.
   2) When the power supply voltage declines to 10.8 V, the BATT indicator lights. At 10.5 V, the Stop mode is automatically entered.
   3) In event of moisture condensation, the DEW indicator lights and the Stop mode is entered. In this and the above cases, button operations are inhibited until normal conditions return.
   4) Durng the COUNTER MEMORY mode, when the indication reaches 0 in FF and REW.
   5) In the FF or REW mode, when the take-up reel stops for more than 4 to 6 seconds, the Stop mode is obtained (due to stop output from counter).

4. Alarm mode

   In the following situations, the Stop mode is automatically set and the mode indicators flash sequentially from left to right. After correcting the difficulty, briefly set the power to off, then to on in order to enable mode operations.
   1) If the brake and pinch switches are not operated on/off within approx. 2.5 seconds after the brake (main) and pinch solenoid commands are sent from the CPU.
   2) Drum rotation stopped; absence of the drum flip-flop signal for 4 to 6 seconds in a mode when the head drum is supposed to rotate.
   3) Take-up reel stops for 2 to 4 seconds in the Play, Recording or Audio Dub mode.
   4) Cassette lamp failure.
   5) Loading or unloading mode does not complete within about 6 seconds after starting.

5. Recording (REC) lock switch
   1) After power on, if the REC lock switch is pressed within about 2 seconds, the Recording mode is obtained.
   2) If another operating button is pressed during this 2 seconds, REC lock is disregarded and the selected mode becomes entered.
   3) REC lock operating is enabled in both loading and unloading modes.
   4) REC lock is inhibited at tape end.
   5) In REC LOCK recording, the REC PAUSE mode is held for about 3 seconds after completion of loading (although REC and PLAY indicators light) in order to obtain stable servo operation. Afterwards, the Recording mode is entered.
   6) In the same manner as for normal Recording mode, other button operations are enabled during the REC LOCK mode.

6. Camera operations (camera connected)
   1) During camera stop, REC operation from the mainframe is inhibited. At other times, it is enabled.
   2) In the camera start mode, REC PAUSE can be set from the mainframe. At this time, recording can be resumed from the camera by briefly setting to camera stop, then to camera start.

7. Other operations
   1) If Still, Slow, REC Pause or Dub Pause are set at the transparent leader portion of the tape, the Play/REC mode is initially performed, then the selected mode becomes entered.
   2) Continuous duration of the Still, Slow, REC Pause and Dub Pause modes is limited to approximately 5 minutes, after which the Stop mode is automatically entered.
   3) When Still or Slow is set during the loading process, the Play mode is performed for about one second after completion of loading, then the selected mode is entered.
   4) At tape end, Play, REC, Dub and FF are inhibited.
   5) At tape start, REW and Q-REV are inhibited.
   6) During the transition from Shuttle Search to Slow or Still, the Play mode is performed for about one second, then the selected mode is entered.
   7) When REC LOCK is set at the starting portion of the tape, after passage of the tape leader, the REC Pause mode is set for about 3 seconds, then the Recording mode is entered.
   8) Both REC and Dub modes are inhibited in absence of the REC safety tab (REC safety switch open).
   9) In absence of the REC safety tab, simultaneously pressing the REC + PLAY or AUDIO DUB + PLAY buttons yields the Play mode.
   10) Pinch roller operation is synchronized to the drum flipflop pulse in the REC, REC Pause, Dub and Dub pause modes.
   11) Frame advance is enabled only in the Still mode. One TV picture frame is advanced every time the FR ADV button is pressed. When the button is held depressed, advance becomes continuous at the rate of one frame per second.

3-3-4. Microcomputer µPD553C-066

The mechacon circuit of this model includes a 1-chip 4-bit microcomputer (located on the audio & CPU board). Its main functions include:

1) Control power supply to the various circuits according to mode.
2) Sequential operation of motors and solenoids for mechanism control according to selected mode.
3) Protective operations in event of moisture condensation on the head drum, take-up system malfunction and other abnormal occurrences.

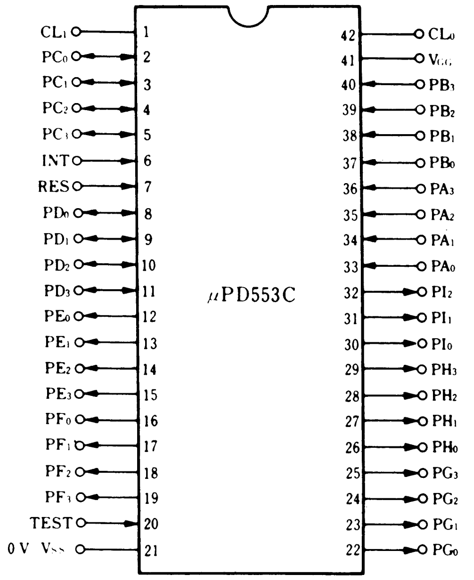


Fig. 3-10 µPD553C

Terminals	Input/Output	Functions
$\overline{\text{INT}}$	Input	Interrupt call input.
RES	Input	Reset input.
$PA_{3\sim0}$	Inputs	Input ports $A_{3\sim0}$. 4 bit input and bit test.
$PB_{3\sim0}$	Inputs	Input ports $B_{3\sim0}$. 4 bit input and bit test.
$PC_{3\sim0}$	Input/output	Input/output ports $C_{3\sim0}$. During input: 4 bit input and bit test. During output: 4 bit output and immediate data output.
$PD_{3\sim0}$	Input/output	Input/output ports $C_{3\sim0}$. During input: 4 bit input and bit test. During output: 4 bit output and immediate data output.
$PE_{3\sim0}$	Outputs	Output ports $E_{3\sim0}$. 4 bit output, and bit set and reset.
$PF_{3\sim0}$	Outputs	Output ports $F_{3\sim0}$. 4 bit output, and bit set and reset.
$PG_{3\sim0}$	Outputs	Output ports $G_{3\sim0}$. 4 bit output, and bit set and reset.

$PH_{3\sim 0}$	Outputs	Output ports $H_{3\sim 0}$. 4 bit output, and bit set and reset.
$PI_{2\sim 0}$	Outputs	Output ports $I_{2\sim 0}$. 3 bit output, and bit set and reset.
$CL_{1\sim 0}$	–	For connecting an external LC resonance circuit (IFT, etc.) for the internal clock oscillator.
TEST	Input	LSI test input. Normally connect to Vss (0 V).

1 machine cycle = 4 clock cycles
1 instruction cycle = 1 to 4 machine cycles
Clock osc. = 400 kHz

1. Input ports
   1) Input ports A are fanned out by data selectors IC1 (A_0) and IC2 (A_1) of the mechanism control board. Table 3-3 shows the inputs of these ICs. The brake and pinch switches are connected to ports A_2 and A_3.
   2) Port B connections are indicated in Table 3-4.

2. Output ports
   1) The outputs of ports C, D and F correspond to the operations of mechacon timing charts a and b, in Fig. 3-11.
   2) E, G and H are power supply mode outputs according to operating mode.
   3) The outputs of ports I select the sensor data inputs to the CPU according to the program contents.

a b c		A_0	A_1	A_2	A_3
0 0 0	D_0	A.L. SW (L)	U.L. SW (L)	Brake SW (L)	Pinch SW (L)
1 0 0	D_1	*Counter output (L)	*Repeat SW (L)		
0 1 0	D_2	Pinch sol. on (L)	Pinch sol. off (H)		
1 1 1	D_3	End sensor (H)	Start sensor (H)		
0 0 1	D_4	Camera pause (H)	Timer, Rec. lock SW (L)		
1 0 1	D_5	Drum rotation detector (H)	Cass. lamp open (H)		
0 1 1	D_6	REC safety (H)	*Cassette SW (L)		
1 1 1	D_7	Batt. down detector & Dew sensor (H)	Take-up abnormal (H)		

(H) : HIGH active
(L) : LOW active

*The counter output repeat SW and cassette SW are not used in this model. These are fixed at H, H and L, respectively.

Table 3-3 Ports A

a b c	B_0	B_1	B_2	B_3
0 1 1	PLAY	REC	PAUSE/STILL	DUB
1 0 1	STOP	FF	REW	FLIP-FLOP
1 1 0	FWD	REV	SLOW	FRAME ADV.

Table 3-4 Ports B

	C	D	E	F	G	H	I
0	Drum motor CTL (L)	Reel motor CTL	REC, FF REW, STOP	Brake (main) sol. (+)	Audio muting	LED DATA	a
1	Capstan motor CTL (L)	Reel motor CTL	REC, DUB, FF REW, STOP	Brake (main) sol. (–)	SLOW	LED CK	b
2	Loading motor (+)	Reel motor CTL	Counter down (L)	Pinch sol. (+)	FRAME ADV.	Power DATA	c
3	Loading motor (–)	Reel motor CTL	Counter operate (L)	Pinch sol. (–)	Cassette lamp	Power CK	

Table 3-5 Ports C, D, E, F, G, H and I

	$D_0D_1D_2D_3$	OUTPUT
0	0 0 0 0	OFF
1	0 0 0 1	REW ⑤
2	0 0 1 0	FF ⑤
3	0 0 1 1	
4	0 1 0 0	PLAY ②
5	0 1 0 1	
6	0 1 1 0	Idler shift ①
7	0 1 1 1	UNLOADING ③
8	1 0 0 0	FWD ④
9	1 0 0 1	REV ④

Decoded by servo circuit

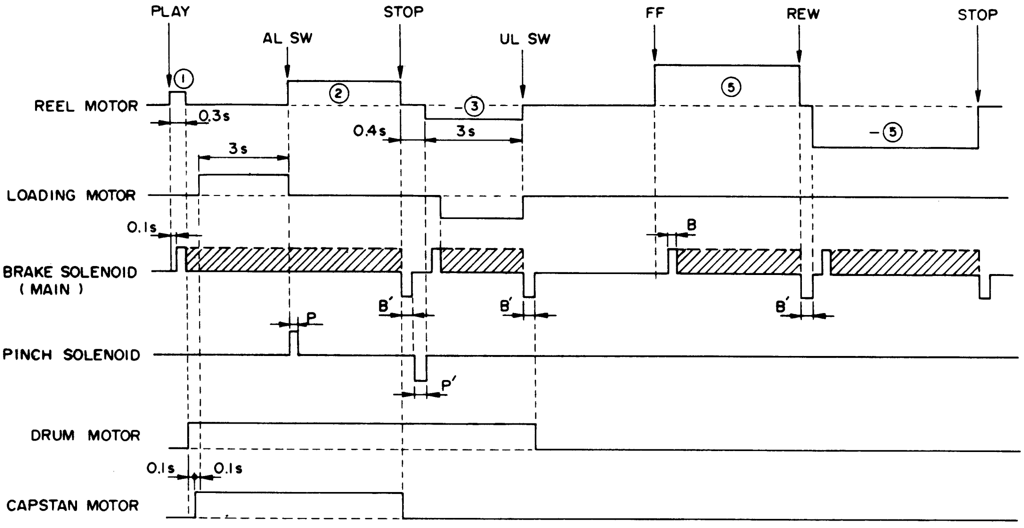
Circled numbers refer to Fig. 3-11,

Table 3-6 Ports D (Reel motor control)

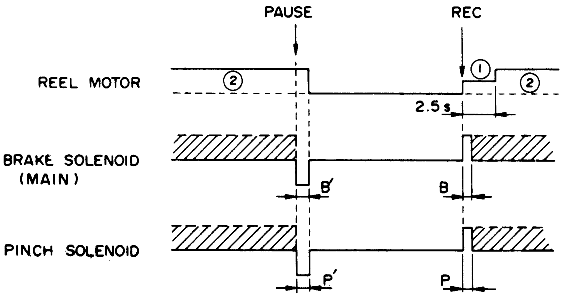
	LED	POWER SUPPLY
1	PAUSE/STILL	AL-PAUSE/STILL
2	DUB (A)	
3	REC (P) (S)	* AL REC PLAY DUB PLAY
4	PLAY	* AL-REC
5	REW	* AL-DUB PLAY
6	STOP	AL PLAY STILL (A) SLOW
7	FF	AL-STILL (S)
8		AL-VP (Y)

- Fan out by shift register.
- *Power supplies 3, 4 and 5 are not used..

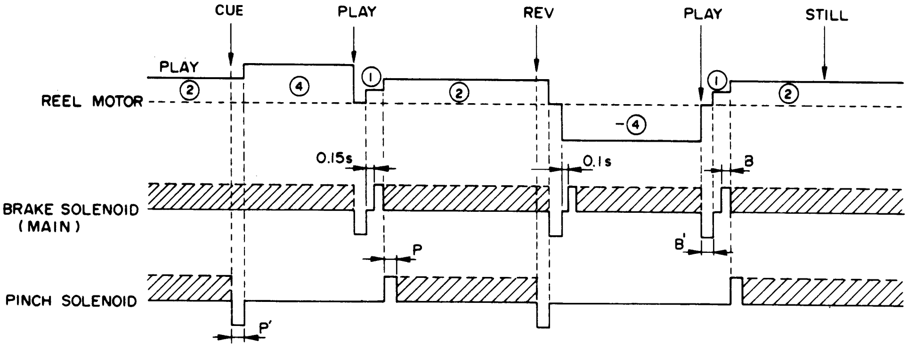
Table 3-7 Ports H


PLAY
AL SW
STOP
UL SW
FF
REW
STOP
REEL MOTOR
①
0.3s
3s
②
0.4s
-③
3s
⑤
-⑤
LOADING MOTOR
0.1s
B
BRAKE SOLENOID
(MAIN)
B'
B'
B'
P
PINCH SOLENOID
P'
DRUM MOTOR
0.1s
0.1s
CAPSTAN MOTOR

(a) Play, FF and REW modes


PAUSE
REC
REEL MOTOR
②
①
②
2.5s
BRAKE SOLENOID
(MAIN)
B'
B
PINCH SOLENOID
P'
P

(b) Pause mode


CUE
PLAY
REV
PLAY
STILL
PLAY
REEL MOTOR
②
④
①
②
-④
①
②
0.15s
0.1s
B
BRAKE SOLENOID
(MAIN)
P
B'
PINCH SOLENOID
P'

(c) Q-CUE, Q-REVIEW and Still modes

NOTE:

1. B : 60 ms after brake switch on
   B' : 100 ms after brake switch on
   P : 60 ms after pinch switch on
   P' : 100 ms after pinch switch on
2. The alarm mode is entered if brake switch and pinch switch are not turned on or off within 2.5 seconds after the main and pinch solenoid operate at the above timings.
3. The shaded sections are held by solenoid latching after energizing.

Fig. 3-11 Mechanism control timing chart

3-4-5. LCD counter

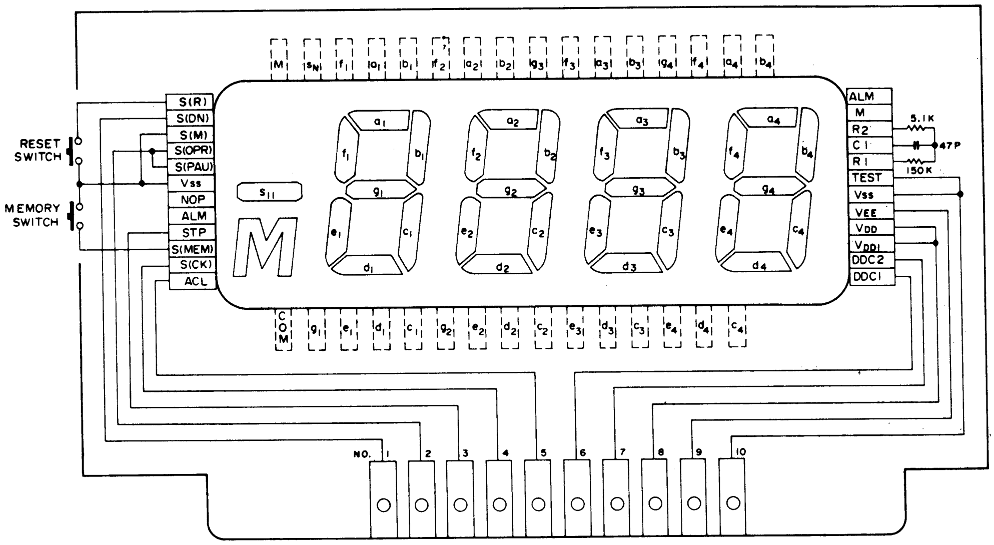

RESET SWITCH
MEMORY SWITCH
S(R)
S(DN)
S(M)
S(OPR)
S(PAU)
Vss
NOP
ALM
STP
S(MEM)
S(CK)
ACL
ALM
M
R2
C I
R I
TEST
Vss
VEE
VDD
VDDI
DDC2
DDCI
5.1K
47P
150K
M
NO.
1
2
3
4
5
6
7
8
9
10

Fig. 3-12 Terminal diagram

This counter module (S-8018V) is a 3 ½ digit up/down counter which functions in reference to a CR oscillator (48 kHz). Liquid crystal display elements with silver back are used, and digit height is 5 mm.

1. Functions
   1) Maximum count is ± 1999.
   2) Memory stop (zero detecting function)
   3) Counter resettings
   4) Count-up and count-down modes
   5) Tape end detecting function

2. Display format
   1) Character form

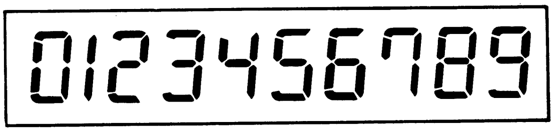

0123456789

Fig. 3-13

2) Display mode

Count contents	Display
1 9 9 9	1999
− 1 2 0	-120
− 2 0	-20
0	0
M 3 0	M 30

Table 3-8

3. Count functions
   1) Count range
      (a) Up-count

      −1999 → −1998 → ..... −1 → 0 → 1 → 1999

      (b) Down-count

      1999 → 1998 → ..... 1 → 0 → −1 → ..... −1999

   2) Count input period

      The count input signal waveform is as follows:

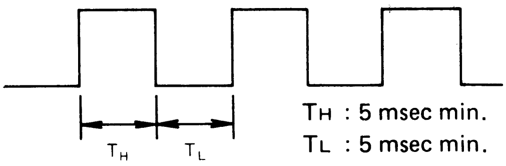

TH
TL
TH : 5 msec min.
TL : 5 msec min.

Fig. 3-14

3) Relationship between count input, count content and display

Three count input pulses increment (decrement) the display by ± 1.

4) Count input detection

The count-up mode is detected when the input pulse at terminal S (CK) drops from Vss (subtrate voltage) to VDD (drain supply voltage).

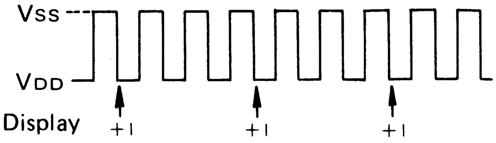

Vss
VDD
Display
+1
+1
+1

Fig. 3-15

Conversely, the count-down mode is detected when the input pulse at terminal S (CK) rises from VDD to Vss.

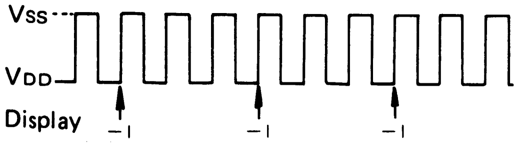


Fig. 3-16

5) Up/down input

VDD at input terminal S(DN) provides count-up and Vss yields count-down. During tape end and memory stop modes, when Vss appears at stop signal output STP, VDD at up/down input S(DN) rises to Vss. The stop output STP then inverts to VDD level.

4. Memory stop (zero detect) mode

1) Memory stop set and release

Pressing the MEMORY button sets the memory stop mode, at which time the letter M appears in the display. This changes the connection of S (MEM) from VDD (or open) to Vss. Release the mode by again pressing the MEMORY button (the M display extinguishes). Operating the MEMORY button does not affect the counter contents of other portions of the display.

2) Memory stop (zero detect) operation

In the memory stop mode, when the counter indication changes to zero, Vss level appears at stop signal output STP. However, if the RESET button is pressed to reset the display to zero, STP remains at VDD.

When the counter contents reach zero from a value other than zero in the memory stop mode, Vss level is obtained from STP output. The memory stop mode is released and the M display extinguishes.

While the counter is at zero, setting the MEMORY switch to ON does not produce Vss from stop output terminal STP which remains at VDD.

During the actual memory stop operation, when S (OPR) rises from VDD to Vss, STP output inverts to VDD.

5. Tape end detector

End of tape is detected when Vss appears at S (OPR) input and pulse is absent at count input S (CK) for 4 to 8 seconds. At this time, STP output is Vss level. When the S (OPR) rises from VDD to Vss, STP output inverts to VDD.

6. Input terminal S (OPR) states

Vss input appears at this terminal during operating modes (Play, Record, FF, REW, Search, etc.). During stopped modes (including Pause), the input level is VDD.

7. Chatter killer

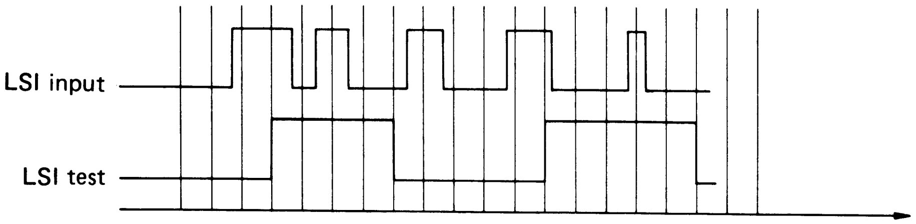
Switch chatter compensation is employed for input terminals S (OPR), S (DN), S (MEM), S (R) and S (CK). Timing functions are shown in Fig. 3-17.

8. Initial settings

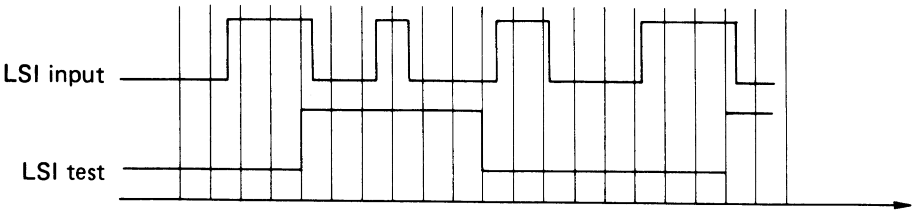
Connecting the all clear (ACL) input terminal to VDD resets the LSI and its outputs.

Counter display	:	0
Memory stop	:	Released (M symbol extenguished)
Stop terminal (STP)	:	VDD level output

The above states are held while ACL is VDD.

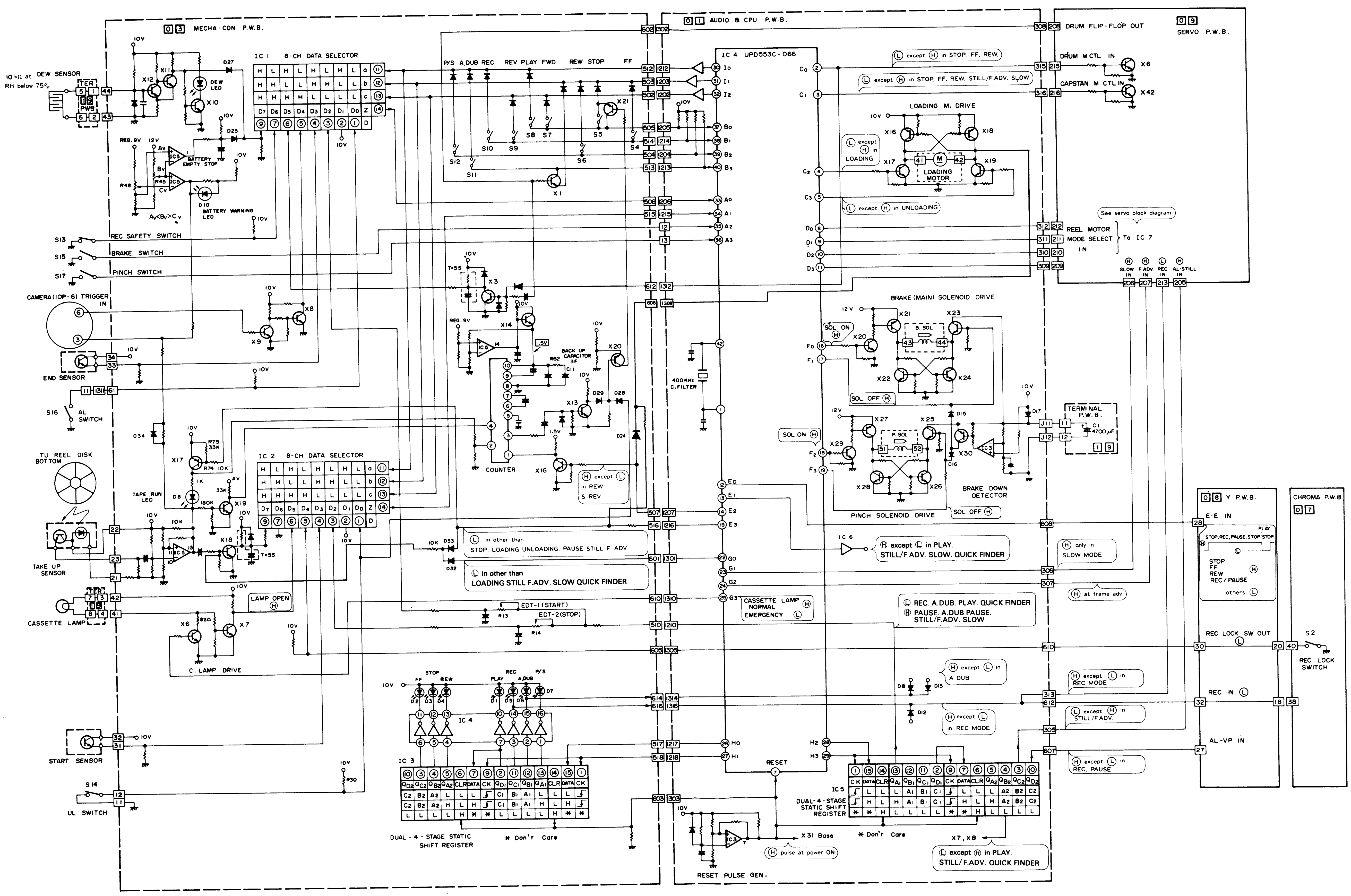


(a) Input terminal other than S(CK) (3.9 ~ 7.8 ms/div)



(b) S(CK) (0.25 ~ 0.5 ms/div)

Fig. 3-17



03 MECHA-CON P.W.B.
01 AUDIO & CPU P.W.B.
09 SERVO P.W.B.
08 Y P.W.B.
CHROMA P.W.B. 07
10 kΩ at RH below 75%
DEW SENSOR
TER PWB
DEW LED
IC 1 8-CH DATA SELECTOR
P/S A.DUB REC REV PLAY FWD REW STOP FF
IC 4 UPD553C-066
DRUM FLIP-FLOP OUT
DRUM M CTL IN
CAPSTAN M CTL IN
Ⓛ except Ⓗ in STOP, FF, REW.
Ⓛ except Ⓗ in STOP, FF, REW, STILL/F.ADV, SLOW
LOADING M. DRIVE
Ⓛ except Ⓗ in LOADING
LOADING MOTOR
Ⓛ except Ⓗ in UNLOADING
See servo block diagram
REEL MOTOR MODE SELECT IN
To IC 7
SLOW IN F.ADV IN REC IN AL-STILL IN
BATTERY EMPTY STOP
BATTERY WARNING LED
Av<Bv>Cv
REC SAFETY SWITCH
BRAKE SWITCH
PINCH SWITCH
S13 S15 S17
CAMERA (10P-6) TRIGGER IN
END SENSOR
S16 AL SWITCH
TU REEL DISK BOTTOM
TAPE RUN LED
TAKE UP SENSOR
CASSETTE LAMP
LAMP OPEN Ⓗ
C. LAMP DRIVE
START SENSOR
S14 UL SWITCH
IC 2 8-CH DATA SELECTOR
BACK UP CAPACITOR 3F
COUNTER
Ⓗ except Ⓛ in REW S-REV
400KHz C.FILTER
BRAKE (MAIN) SOLENOID DRIVE
SOL. ON Ⓗ
B. SOL
SOL. OFF Ⓗ
P. SOL
BRAKE DOWN DETECTOR
PINCH SOLENOID DRIVE
TERMINAL P.W.B.
C1 4700μF
Ⓛ in other than STOP, LOADING UNLOADING, PAUSE STILL F. ADV
Ⓛ in other than LOADING STILL F.ADV. SLOW QUICK FINDER
IC 6
Ⓗ except Ⓛ in PLAY, STILL/F.ADV. SLOW, QUICK FINDER
Ⓗ only in SLOW MODE
Ⓗ at frame adv
CASSETTE LAMP Ⓗ NORMAL EMERGENCY Ⓛ
Ⓛ REC, A.DUB, PLAY, QUICK FINDER
Ⓗ PAUSE, A.DUB PAUSE, STILL/F.ADV. SLOW
EDT-1 (START)
EDT-2 (STOP)
E-E IN
PLAY STOP, REC, PAUSE, STOP STOP
STOP FF REW REC/PAUSE Ⓗ others Ⓛ
REC LOCK SW OUT
S2 REC LOCK SWITCH
REC IN Ⓛ
AL-VP IN
Ⓗ except Ⓛ in A DUB
Ⓗ except Ⓛ in REC MODE
Ⓛ except Ⓗ in STILL/F.ADV
Ⓗ except Ⓛ in REC. PAUSE
IC 3
DUAL-4-STAGE STATIC SHIFT REGISTER
* Don't Care
IC 5
RESET
RESET PULSE GEN.
X31 Base
Ⓗ pulse at power ON
X7, X8
Ⓛ except Ⓗ in PLAY, STILL/F.ADV. QUICK FINDER
STOP FF REW REC PLAY P/S A.DUB

Fig. 3-18 Mechanism control circuit

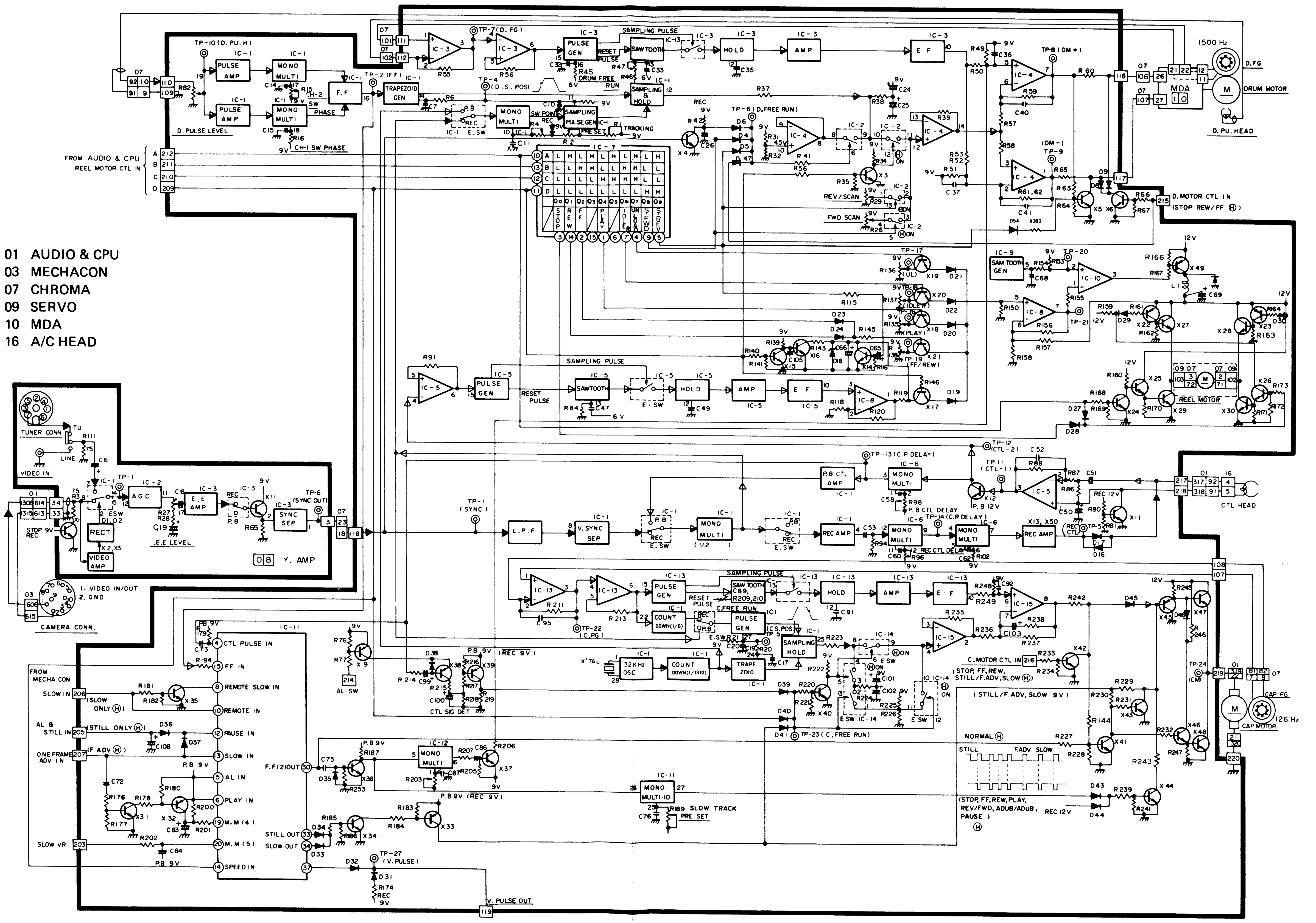

01 AUDIO & CPU
03 MECHACON
07 CHROMA
09 SERVO
10 MDA
16 A/C HEAD
TP-10 (D. PU. H)
PULSE AMP
MONO MULTI
F. F
TRAPEZOID GEN
D. PULSE LEVEL
CH-1 SW PHASE
FROM AUDIO & CPU REEL MOTOR CTL IN
TP-7 (D. FG)
PULSE GEN
RESET PULSE
SAW TOOTH
SAMPLING PULSE
SAMPLING & HOLD
HOLD
AMP
E·F
DRUM FREE RUN
TP-4 (D. S. POS)
SW POINT
SAMPLING PULSE GEN
PRE SET
TRACKING
TP-6 (D. FREE RUN)
TP-8 (DM+)
(DM-) TP-9
1500 Hz
D. FG
DRUM MOTOR
D. PU. HEAD
MDA
D. MOTOR CTL IN (STOP REW/FF Ⓗ)
REV/SCAN
FWD SCAN
IC-7
STEP
REF W
PLAY
IDLER
UN SLACK
FF/REW
TP-17
TP-18 (IDLER)
TP-16 (PLAY)
TP-19 FF/REW
TP-20
SAW TOOTH GEN
TP-21
REEL MOTOR
SAMPLING PULSE
RESET PULSE
E·SW
TUNER CONN
LINE
VIDEO IN
TP-1
AGC
E.E AMP
SYNC SEP
RECT.
VIDEO AMP
E.E LEVEL
08 Y. AMP
TP-6 (SYNC OUT)
CAMERA CONN.
1. VIDEO IN/OUT
2. GND
TP-1 (SYNC)
L.P.F
V. SYNC SEP
MONO MULTI (1/2)
TP-13 (C.P DELAY)
P.B CTL AMP
P.B CTL DELAY
TP-14 (C.R DELAY)
REC AMP
REC CTL DELAY
TP-12 (CTL-2)
TP-11 (CTL-1)
CTL HEAD
COUNT DOWN (1/6)
TP-22 (C.PG)
C. FREE RUN
X'TAL
32 KHz OSC
COUNT DOWN (1/1310)
TRAPE ZOID
TP-23 (C. FREE RUN)
E SW
C. MOTOR CTL IN
(STOP, FF, REW, STILL/F.ADV, SLOW Ⓗ)
(STILL/F.ADV, SLOW 9V)
NORMAL Ⓗ
STILL
FADV SLOW
(STOP, FF, REW, PLAY, REV/FWD, ADUB/ADUB, PAUSE) Ⓗ
TP-24 (CM)
CAP FG
126 Hz
CAP MOTOR
FROM MECHA CON
SLOW IN
(SLOW ONLY Ⓗ)
AL & STILL IN
(STILL ONLY Ⓗ)
ONE FRAME ADV IN
(F. ADV Ⓗ)
SLOW VR
CTL PULSE IN
FF IN
REMOTE SLOW IN
REMOTE IN
PAUSE IN
SLOW IN
AL IN
PLAY IN
M.M (4)
M.M (5)
SPEED IN
F.F (2) OUT
STILL OUT
SLOW OUT
AL SW
CTL SIG DET
MONO MULTI-10
SLOW TRACK PRE SET
TP-27 (V. PULSE)
V. PULSE OUT

Fig. 3-19 Servo block diagram

3.5. SERVO CIRCUITS

3-5-1. Outline

Three servo circuits are used in this model: drum, capstan and reel. These are located on the SERVO board, while the drum motor drive (MDA) circuit is contained on a separate board.

1. Drum servo

   The video head drum is driven directly by a DC motor. An FG (frequency generator) pulse is produced by the combination of sixty rotating magnets and detector coils (FG board). The 1.5 kHz pulse is detected to perform speed servo control. At the same time, the rotating drum shaft includes a pulse generator (PG) which provides a 25 Hz pulse signal which is compared in phase with the vertical sync component of the input video signal. Phase control is thus performed to maintained fixed head drum rotation.

   During playback, a 25 Hz reference signal is obtained from a crystal oscillator. This is compared in phase with the 25 Hz drum pulse for controlling video head drum rotation.

2. Capstan servo

   A DC motor and belt drive the capstan. The capstan servo circuit functions to maintain fixed tape speed. The capstan flywheel includes 68 magnets which are detected by coils of the FG board. The resulting 126 Hz pulse is used for speed servo control.

   At the same time, the FG pulse is divided to become a 25 Hz comparison signal. This is compared with a reference signal obtained from a crystal oscillator to perform phase control and maintain fixed rate capstan rotation.

   The control signal for playback reference is supplied to the control head for recording on the tape. During playback, the control signal from the tape is used as the comparison signal in place of the FG pulse. Phase is compared in the same manner as during recording to regulate capstan rotation.

3. Reel servo

   Speed servo is applied to the reel motor during the quick finder mode by detecting the control signal of the tape. At other times, the reel servo functions to maintain stable tape winding.

3-5-2. Block diagram descriptions

1. Drum servo circuit signal flow

   1) Recording

   The vertical sync component of the video signal is used for drum servo reference during recording. Composite sync is separated from the input video signal and applied from the Y board to terminal 118 of the SERVO board. The signal goes to a sync detector (X4) and to a lowpass filter (LPF) which passes the vertical sync component.

   After separation, the vertical sync frequency is divided to 1/2 and branched in two directions. One of these goes through an electronic switch to the recording phase control circuit (monostable multivibrator). The other via another monostable, is amplified and supplied to the control head for recording on the tape as the control signal.

   In the recording phase control circuit, R4 adjusts the monostable time constant to control the rotating head phase (position). Each of the two rotating heads covers one TV field and switching between the heads is performed at a point just before the vertical sync signal. This prevents switching noise from appearing in the picture. Afterwards, the signal is supplied to the phase comparator circuit.

   The 25 Hz pulse corresponding to the rotating head phase is supplied from the drum pickup head to terminal 110. The pulse is amplified and triggers monostables of the pulse phase control circuit. In this manner, the monostable rise pulse compensates for mechanical errors in the mounting positions of the two magnets.

   The monostable rise component triggers the next stage bistable multivibrator circuit to produce a 25 Hz symmetrical squarewave. This signal is sent from terminal 105 (FF-1 OUT) to terminal 5 of the CHROMA board for FM signal switching, and from terminal 208 (FF-2 OUT) to terminal 308 of the AUDIO & CPU board. The signal is also supplied to IC11 pin 15 for controlling variable speed playback (Slow, Still and Frame Advance), and to the trapezoid converter.

   In the phase comparator (sample & hold) circuit, the slanting component of the trapezoidal waveform is sampled by the pulse obtained from the recording phase control circuit. This converts phase variation into voltage variation to yield an error voltage. A loop filter composed of R37, R38 C24 and C25 determines the response characteristic of the error voltage, which is then supplied to the mode selector circuit of IC2.

   IC2 is a 4 circuit electronic switch that becomes ON with high potential at the control terminal and OFF with low potential. The error voltage through this switch is amplified by IC4 (pins 12, 13 and 14) and supplied to the invert terminal of a differential amplifier.

   In another route, the 1.5 kHz FG pulse, which corresponds to the drum rotating speed, is supplied to terminal 112. The pulse is amplified, shaped and applied to the pulse generator circuit. This circuit generates sampling and reset pulses, and the ramp voltage of the sawtooth waveform is sampled.

   C35 holds the error voltage and after amplification and impedance conversion (error voltage is inverted), the voltage is applied to the noninvert terminal of the differential amplifier.

   Of the two differential amplifier outputs, TP8

(DM+) is for positive torque and TP9 (DM–) for reverse torque. When the output of either TP8 or TP9 exceeds approximately 5.5 V, the motor drive circuit functions and the motor begins turning. Output switching for TP8 and TP9 is performed by resistance dividing the output of a discriminator circuit (pin 10 of IC3) and switching the IC4 differential amplifier outputs. Threshold voltage of the discriminator is approx. 2.2 V.

Above this value, TP8 voltage is higher than TP9, while TP9 voltage is higher at below 2.2 V. The resulting output goes to the motor drive amplifier (MDA).

The MDA performs DC amplification of the differential amplifier output and in accordance with the error voltage, supplies current to the motor drive coil. See also the drum motor drive circuit (Section3-5-12).

2) Playback

During playback, the reference signal is obtained from a crystal oscillator located on the SERVO board. IC1 of the SERVO board produces 32.768 kHz, which is counted down 1/1311 to become 25 Hz. This signal goes through an electronic switch to the playback phase control circuit (same monostable system as during recording).

Tracking controls R1 and R2 adjust the monostable time constant and thus regulate the rotating head phase (position) so that the rotating heads trace the recorded signal tracks. This control signal is supplied to the phase comparator and becomes the sampling pulse. Comparison signal flow is the same as during recording.

2. Capstan servo signal flow

1) Recording mode

The crystal oscillator of SERVO board IC1 produces 32.768 kHz which is counted down 1/1311 to 25 Hz. This becomes the reference signal supplied to the trapezoid generator. The resulting trapezoidal waveform goes to the phase comparator.

At the same time, the 126 Hz FG pulse, corresponding to the capstan rotation, is applied to terminal 108. IC13 amplifies the signal and after waveform shaping, IC1 counts the frequency down to 1/5th. The resulting 25 Hz goes via an electronic switch to the sampling pulse generator, then after additional waveform shaping to the phase comparator.

The phase comparator produces an error voltage by converting phase variation into voltage variation. Via the capstan free running switching circuit of IC14, the error voltage is applied to a loop filter composed of R223, R224, C101 and C102. The loop filter determines the response characteristic of the error voltage. IC15 amplifies and supplies the voltage to the invert terminal of the differential amplifier.

In another route, the FG pulse is amplified in IC13 and applied to the pulse generator circuit of IC13. This circuit produces sampling and reset pulses; the ramp voltage of the sawtooth waveform is sampled, and the error voltage obtained. C91 holds the error voltage, which is amplified, impedance converted (error voltage inverted) and applied to the non-invert terminal of IC15 differential amplifier. The voltage from the differential amplifier goes through the motor drive circuit to the capstan motor and controls tape speed.

2) Playback mode

Reference signal and speed control are the same as for recording.

The control head picks up the control signal from the tape and supplies it to terminal 217.

The signal is amplified by IC5 and X12, and goes to the phase monostable of IC6. The phase is delayed by about 20 msec in order to preserve its relationship with that during recording. Via IC1 control amplifier, pulse counter and electronic switches, the signal is supplied to the phase comparator. Operations after the phase comparator are the same as for recording.

In the shuttle search mode, the control signal is played back at about 10 times its normal frequency, producing a large change in the sampling error voltage. Consequently, in this mode, IC14 electronic switch and IC13 discriminator circuits operate so that the capstan motor rotates at nearly the same rate as during the play mode.

3-5-3. Reel servo signal flow

The reel servo circuit regulates reel motor and consequently reel disk rotation according to mode. In modes other than quick finder, the control signal from the AUDIO & CPU board is decoded at IC7. Through electronic switches X18 to X21 and voltage setting resistors R135 to R138, the signal goes as the mode reference voltage to IC8 opamp (operational amplifier).

IC10 voltage comparator compares the opamp output with the voltage from IC9 oscillator. The comparator output is amplified by X49 and converted to a DC voltage by a filter circuit. This is supplied to both the reel motor drive circuit and the reverse phase input of IC8 as feedback for maintaining fixed rate rotation of the reel motor.

In the quick finder mode, the pinch roller is separated from the capstan. Reel motor rotation is transferred to the reel disks to perform tape transport. The tape speed becomes about 10 times that of the normal play mode and at this time, the reference voltage for driving the reel motor is obtained from the control pulse.

The playback control pulse picked up by the control head is amplified by IC5 and X12, then returned to the sampling & hold circuit of IC5 where the error voltage is detected. This voltage is amplified by IC5 and IC8 to become the quick finder mode reference voltage through X17 electronic switch. Signal flow from this point is the same as for other modes.

3-5-4. Sampling & hold circuit

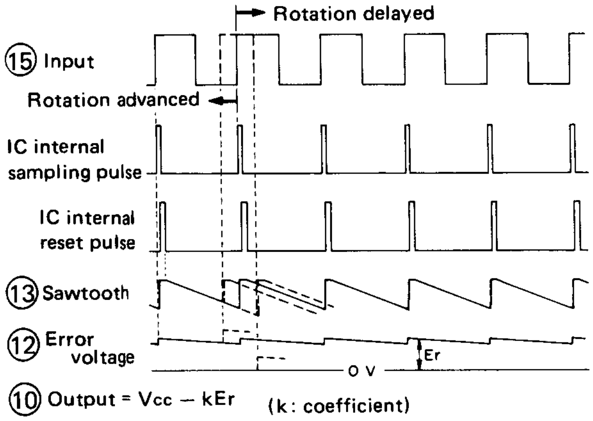


Fig. 3-20 Sampling & hold

Fig. 3-20 shows the timing chart for this circuit. In absence of an input signal (stop mode, etc.) or when the input signal frequency is very low (motor starting period), the output voltage becomes high. This high becomes the voltage flow for increasing the motor speed. When the motor speed increases, the sampling voltage increases by the timing shown in the figure and the output voltage decreases. By setting the time constant of the sawtooth waveform, the sampling voltage required for maintaining fixed motor rotation can be obtained.

3-5-5. Drum motor control circuit

High potential at terminal 215 of the SERVO board switches X6 on, grounding the differential amplifier output. This cuts off voltage to the motor drive circuit and the motor does not rotate. This control signal is supplied from the MECHACON board.

3-5-6. Drum free running circuit

1. In absence of a video signal (sync signal) during the recording mode, high from X4 sync detector sets the mode selector switch of IC2 on. The power supply voltage is divided by R31 and R32 and goes through IC4 (pins 10 and 8) and IC2 electronic switch to become the reference voltage in place of the drum phase error voltage. The discriminator circuit (adjusted by R47) regulates drum motor rotation for approximately 25 Hz. This reduces the time needed for synchronization when an input sync signal becomes available.
2. Drum phase error response characteristic is determined by a loop filter which possesses a very long time constant. Thus, when power on and rec/play are set simultaneously, time is required until the error voltage charges loop filter capacitor C25, increasing the time needed to obtain synchronous rotation of the drum. In order to minimize this effect, high potential at terminal 215 of the SERVO board switches IC2 mode selector on. Since drum free running voltage becomes applied to the loop filter capacitor, the drum lock in time is shortened.

3-5-7. Horizontal correction

1. In this model, the Slow motion mode is produced by alternating between Still and Normal tape speed. This results in a relative speed difference of about 0.5% between the two modes. In order to minimize horizontal instability in the playback picture, a correction pulse is applied to the drum motor when the tape is moving.
2. During the CUE quick finder mode, the tape is transported at approximately 10 times normal speed. This introduces a relative speed delay of about −4% between the recorded track and the trace of the video heads. As the AFC locking range of most TV receivers becomes exceeded, compensation is performed by IC2 mode selector switch to apply forward scan voltage (adjustable by R26) and increase the motor rotation by approximately +4%.
3. Conversely, the relative speed becomes advanced by about +5% in the Review quick finder mode. At this time reverse scan voltage (adjusted by R29) is applied for approximately −5% delay.
4. Motor inertia must be compensated when returning from the CUE quick finder to the Normal Play mode. This is done by applying reverse torque from the brake drive circuit. Similar compensation is not applied in the case of switching from the Review quick finder to the Normal Play mode, since the time required for the idler shift operation would largely defeat its effectiveness.
5. MDA protector switch
   As mentioned above, motor forward or reverse torque is determined by high (approx. 5.5 V) at TP-8 or TP-9. If for some reason, high appears simultaneously at both points, current would not flow in the motor coil and risk of transistor breakdown would occur. For this reason, X5 switching bias is set for approx. 5 V at TP-8, which is near the switching voltage of TP-8 and TP-9.

3-5-8. Capstan free run circuit

This circuit functions in the following conditions.

1) Before completion of loading and the REC mode is not entered, X39 is on and its collector high.
2) At completion of loading (AL switch on) in the Play mode, and in absence of the control signal, X38 is off and X39 on (collector high).
3) When high from MECHACON board appears at terminal 209 (CUE or Review quick finder mode).
4) During Slow or Still (including Frame Advance) mode with high supplied from IC11.

When any of the above conditions is fulfilled, IC14 electronic switch operates. 9 V divided by R225 and R226 is supplied to IC15 amplifier in place of the error voltage from the phase comparator. In absence of the above conditions, capstan motor rotation becomes controlled by IC13 discriminator circuit. This process reduces the time needed for capstan synchronization when changing modes.

3-5-9. Capstan motor control (CM CTL)

Two control systems are used, one for Normal modes and the other for Slow and Still modes.

1. Normal Modes (Stop, FF, REW)
   Control is performed by X42 and X44. High at terminal 216 (controlled from the MECHACON board) switches transistor X42 on. This grounds the differential amplifier output of IC15 and cuts off diode switch D45.
   For example, if X44 is on while D45 is cut off, X45 becomes fully on (bias current set by R243). This switches off motor drive transistor X47 by reverse base bias and the motor does not rotate.

2. Slow and Still modes
   Separate control circuits are used for the Slow and Still, and the Normal modes. Since tape travel is intermittent in the Slow mode, a slow pulse signal is supplied from IC11 (BA841) to the motor control circuit.
   1) High from the MECHACON board is applied to terminal 216 during the Slow and Still modes. This switches X42 on, grounds the output of IC15 differential amplifier and cuts off D45 switch.
   2) During these modes, motor control voltage from IC11 (pins 33 and 34), X33 and X34 is supplied to R229 and R230.

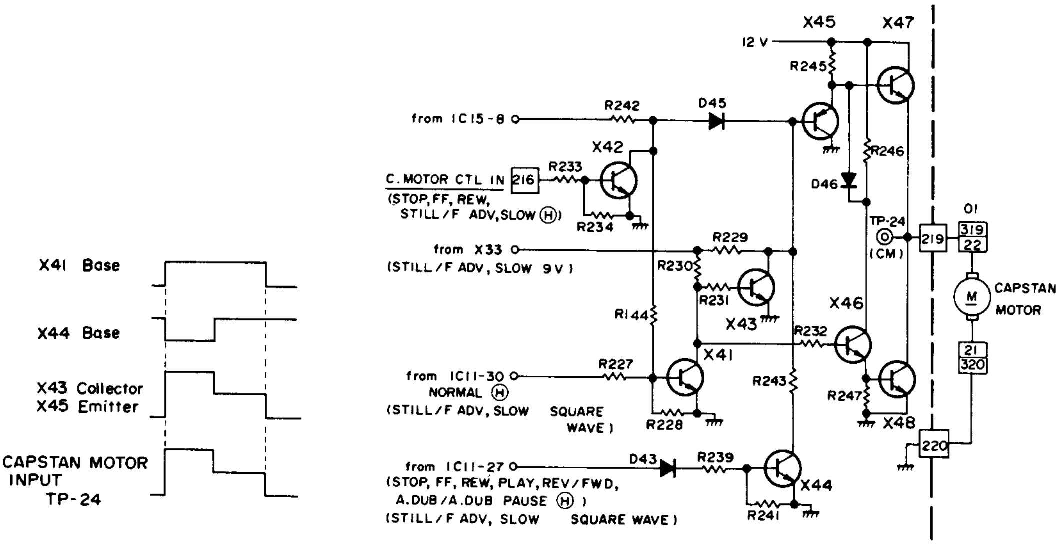

X41 Base
X44 Base
X43 Collector
X45 Emitter
CAPSTAN MOTOR INPUT
TP-24
X45
X47
12 V
R245
from IC15-8
R242
D45
X42
R233
C.MOTOR CTL IN
216
(STOP, FF, REW, STILL/F ADV, SLOW Ⓗ)
R234
R246
D46
TP-24
(CM)
219
01
319
22
from X33
(STILL/F ADV, SLOW 9V)
R229
R230
R231
X43
R144
X46
CAPSTAN MOTOR
M
R232
X41
R227
from IC11-30
NORMAL Ⓗ
(STILL/F ADV, SLOW SQUARE WAVE)
R228
R243
R247
X48
21
320
220
from IC11-27
D43
R239
X44
(STOP, FF, REW, PLAY, REV/FWD, A.DUB/A.DUB PAUSE Ⓗ)
(STILL/F ADV, SLOW SQUARE WAVE)
R241

Fig. 3-21 Slow and Still mode

   3) Slow pulse for controlling capstan motor rotation is supplied from IC11 pin 30 to X41.
   4) A sub-control pulse from IC11 pin 27 is supplied to X44.
   5) In the Slow mode, the squarewave pulse rise from IC11 pin 30 switches X41 on, and X43, X46 and X48 off, while the negative pulse switches X44 off. 9 V from X33 goes through R229 to X45 base, nearly cutting off this transistor. The emitter output of X47 goes high and the capstan motor begins rotating.
      When X44 pulse ceases, high base potential switches X44 on. The voltage divided by R229 and R243 biases X45 and the emitter outputs of X45 and X47 decline. IC11 pin 30 pulse fall switches X43 and X45 on, X47 off, and X46 and X48 on. The motor then stops.

3-5-10. Frame advance circuit

The BA841A IC contains local and remote slow motion inputs. As illustrated in the IC block diagram, the output of monostable 3, which determines the starting position of the capstan motor drive squarewave, is applied to the inputs of monostables 4 and 5. Monostable 5 determines the slow motion speed for remote control unit operation (IC11 pin 8). Ordinarily, monostable 4 regulates the speed for local slow motion, but in this model, it is used for the frame advance function.

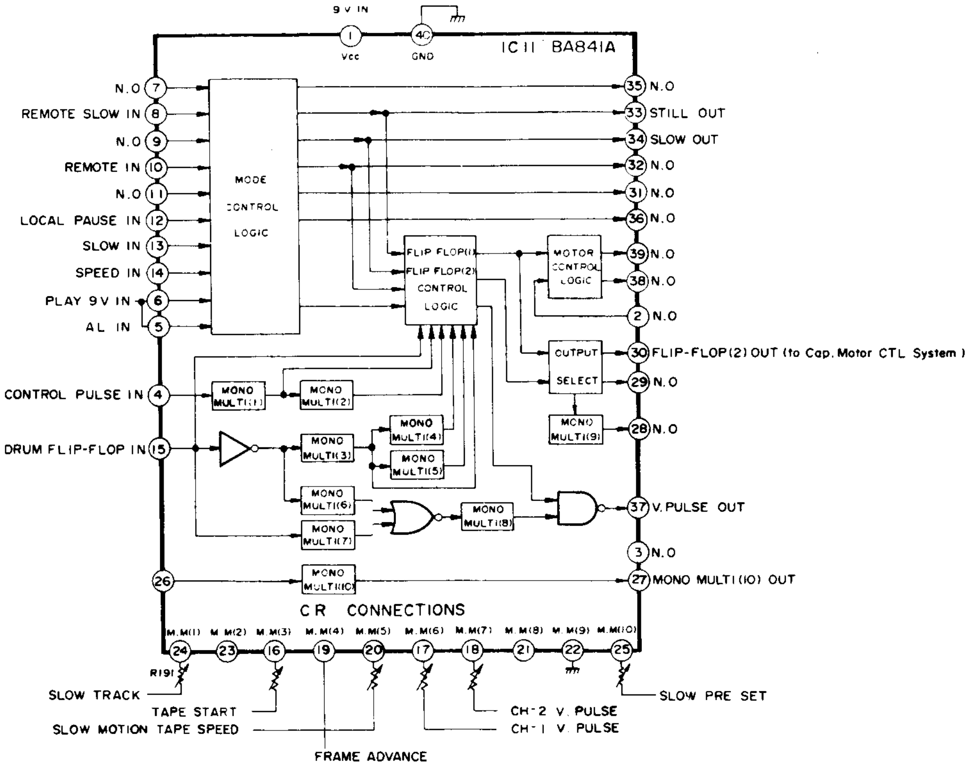

9 V IN
Vcc
GND
IC11 BA841A
N.O 7
REMOTE SLOW IN 8
N.O 9
REMOTE IN 10
N.O 11
LOCAL PAUSE IN 12
SLOW IN 13
SPEED IN 14
PLAY 9V IN 6
AL IN 5
CONTROL PULSE IN 4
DRUM FLIP-FLOP IN 15
26
MODE CONTROL LOGIC
FLIP FLOP(1)
FLIP FLOP(2)
CONTROL LOGIC
MOTOR CONTROL LOGIC
OUTPUT SELECT
MONO MULTI(1)
MONO MULTI(2)
MONO MULTI(3)
MONO MULTI(4)
MONO MULTI(5)
MONO MULTI(6)
MONO MULTI(7)
MONO MULTI(8)
MONO MULTI(9)
MONO MULTI(10)
35 N.O
33 STILL OUT
34 SLOW OUT
32 N.O
31 N.O
36 N.O
39 N.O
38 N.O
2 N.O
30 FLIP-FLOP(2) OUT (to Cap. Motor CTL System)
29 N.O
28 N.O
37 V. PULSE OUT
3 N.O
27 MONO MULTI (10) OUT
CR CONNECTIONS
M.M(1) M.M(2) M.M(3) M.M(4) M.M(5) M.M(6) M.M(7) M.M(8) M.M(9) M.M(10)
24 23 16 19 20 17 18 21 22 25
R191
SLOW TRACK
TAPE START
SLOW MOTION TAPE SPEED
FRAME ADVANCE
CH-2 V. PULSE
CH-1 V. PULSE
SLOW PRE SET

Fig. 3-22 BA841A

Input modes versus outputs for the BA841A as used in this model are indicated in Table 3-10.

Mode inputs and control outputs are shown in Table 3-9.

As indicated in Table 3-9, low at pin 13 produces the Still mode, while high yields the Frame advance mode. When the FR ADV button is pressed, high from the AUDIO & CPU is supplied via terminal 207. At this point, the starting pulse position of pin 30 (FF2 OUT) is determined by monostables 3 (start) and 4 (speed).

During the Slow mode, at the point when both monostables 3 and 4 are charged, monostable 4 becomes triggered and FF2 start pulse rises. When the FR ADV button is pressed, monostable 4 rapidly charges and after a slight delay, FF2 pulse is produced. By holding the FR ADV button depressed, the frames are advanced continuously at the time constant of monostable 4 (about 1 second). See slow and still timing chart of section 9.

Pin No.	Mode / Name	STILL	SLOW	SEARCH	PLAY
33	STILL OUT	H	L	L	L
34	SLOW OUT	L	H	L	L
30	FF (2) OUT	L	O	H	H
37	V. PULSE OUT	O	O	O	H

Note: Circle designates square wave pulse.

Table 3-9

								Output	
Pin No.	5	6	8	10	12	13	14	33	34
Pin Name / Mode	AL	PLAY	Remote SLOW	Remote	Local PAUSE	Local SLOW	Local SPEED	STILL	SLOW
STILL	H	H		L	H	L		H	
SLOW	H	H	L	H					H
FR. ADV.	H	H		L	H	H			H
SEARCH	H	H		L	L		H		

Table 3-10

3-5-11. Reel motor drive circuit

A switching regulator circuit is employed for driving the reel motor. By switching the control transistor on and off, and using a transistor (X49) with low V_{CE} (collector to emitter voltage), electrical power can be used effectively.

The reference voltage is amplified about 1.5 times and sent to the output. Test points and voltages are listed in Table 3-11.

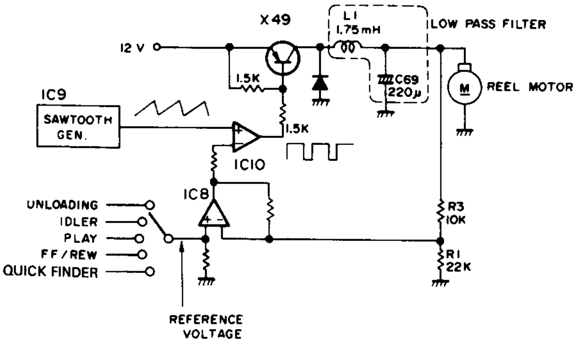

X49
L1
1.75mH
LOW PASS FILTER
12 V
1.5K
C69
220μ
M
REEL MOTOR
IC9
SAWTOOTH GEN.
1.5K
IC10
IC8
R3
10K
R1
22K
UNLOADING
IDLER
PLAY
FF/REW
QUICK FINDER
REFERENCE VOLTAGE

Fig. 3-23

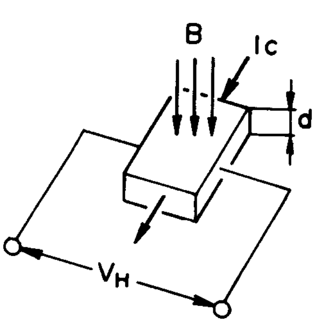
Mode	Check point	Adjusting point	Voltage value
PLAY	CN1-102	R135	2.3
UNLOADING	CN1-103	R136	2.5
FF (REW)	CN1-102(103)	R137	9.0

Table 3-11

3-5-12. Drum motor drive circuit

1. Hall element

   In certain semiconductors, when a current (I_c) flows perpendicular to magnetic lines of force (B), a voltage (V_H) becomes produced which is perpendicular (3 dimensionally) to both the current and magnetic field. This is termed the Hall effect and forms the principle utilized by Hall elements. The basic diagram of a Hall element is shown in Fig. 3-24.



$$V_H = R_H \times \frac{I_c \times B}{d}$$

R_H = material constant (Hall coefficient)

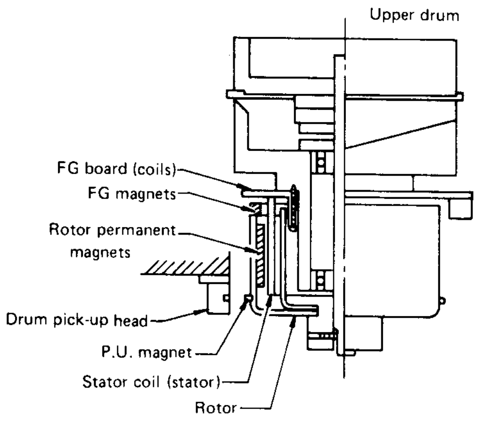
d = conductor thickness

Fig. 3-24 Hall element

2. Direct drive (DD) motor

   This motor is composed of a magnetic outer rotor and an inner coil stator. Hall elements detect the rotor angular position and speed is adjusted by varying the voltage applied to the stator coils.

   A reverse torque circuit is provided in parallel with the Hall detector elements. When required, current is applied to the coils in order to reduce the time needed for synchronized rotation.


Upper drum
FG board (coils)
FG magnets
Rotor permanent magnets
Drum pick-up head
P.U. magnet
Stator coil (stator)
Rotor

Drum ass'y

Fig. 3-25

3-5-13. Quick Finder

Quick finder (CUE and REVIEW) is enabled only during the Play, Slow and Still modes while the appropriate button is pressed. Releasing the button returns the prior mode.

1. Tape pattern and FM output

   Fig. 3-26 illustrates the tape pattern during the CUE and REVIEW quick finder modes. Because of the approximately 10 times tape speed, each video head traces 10 recorded tracks. However, due to the 12° azimuth difference, an effective signal output is obtained only when each head traces its corresponding track. The resulting FM output signal becomes a diamond shaped waveform as shown in the figure. Since an output is not obtained when each head traces the other's track, a moving noise bar appears in the playback picture display.

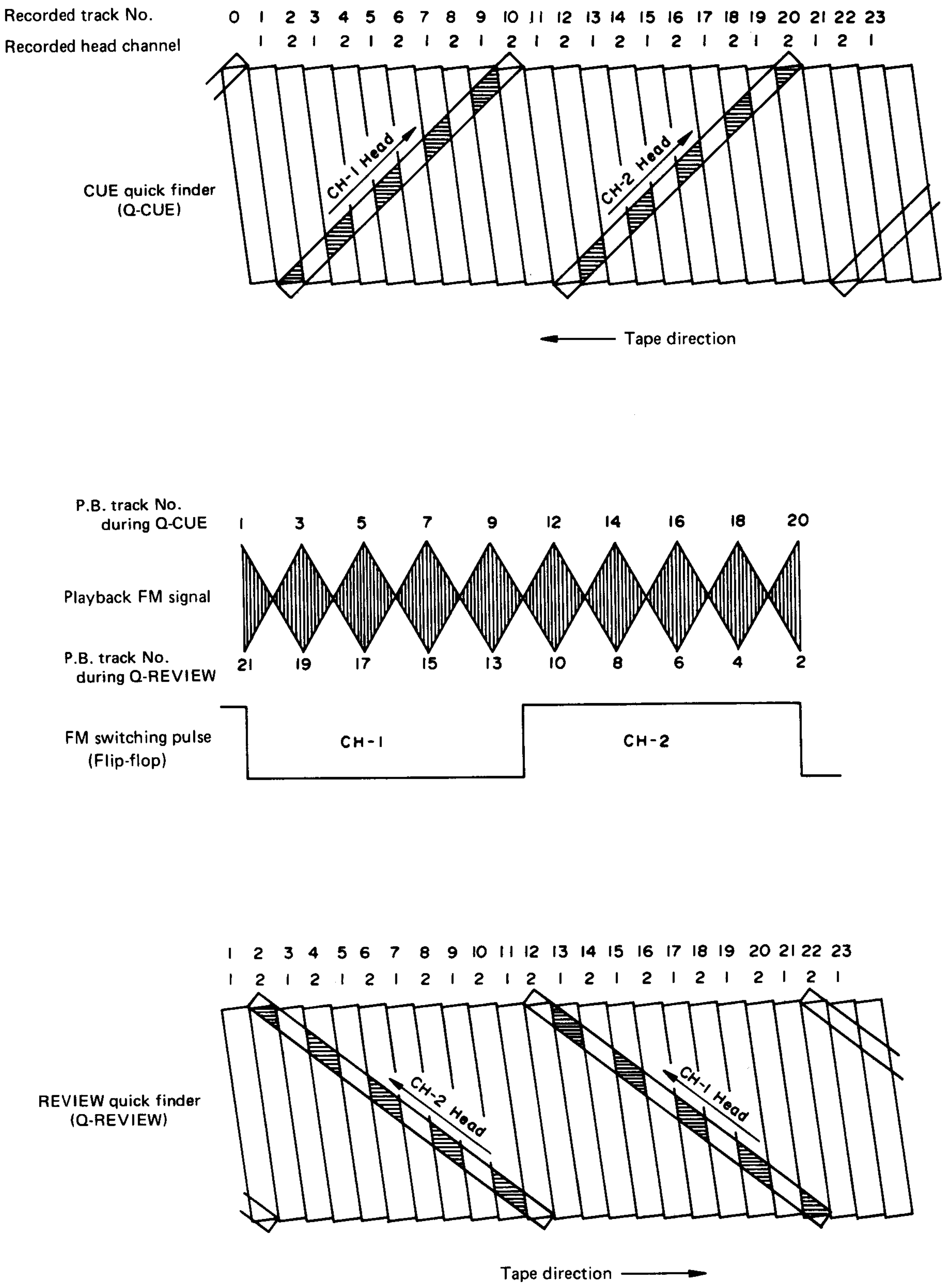

Recorded track No.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Recorded head channel
1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1
CH-1 Head
CH-2 Head
CUE quick finder
(Q-CUE)
Tape direction
P.B. track No.
during Q-CUE
1 3 5 7 9 12 14 16 18 20
Playback FM signal
P.B. track No.
during Q-REVIEW
21 19 17 15 13 10 8 6 4 2
FM switching pulse
(Flip-flop)
CH-1
CH-2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1
CH-2 Head
CH-1 Head
REVIEW quick finder
(Q-REVIEW)
Tape direction

Fig. 3-26 Quick Finder

2. Relative speed

The Quick Finder mode introduces a large deviation in relative speed between the video heads and the tape. An additional variation is caused by the CUE and review tape directions.

Relative speed $V_H = D\pi f \pm V_t$

D : Drum diameter
f : Drum rotation rate
V_t : Tape speed

In the CUE direction, the relative speed is approximately −4.3% and in the review direction it becomes about +5.3%. Since this exceeds the AFC locking range of the average TV receiver, compensation is required in the from of increasing the drum rotation by about 4.3% in the CUE mode and delaying it by about 5.3% in the review mode.

A synthesized vertical sync pulse is also inserted during the Quick Finder mode to compensate for the effects of noise on the vertical stability of the picture.

3-6. ACCESSORY CIRCUITS

3-6-1. Battery charging and heater circuits

1. VP-77EG/EK + VU-77EG/EK

   Using the VU-77EG/EK, a battery pack can be charged under the following conditions.
   1) Rear panel MAINS POWER switch to ON.
   2) Front panel OFF button depressed.
   3) Battery internal thermostat shorted to ground (i.e., battery itself is cool).
   4) At this time, press the front panel CHARGE START button to begin charging.

2. Battery charging with VA-77EG/EK
   1) Front panel POWER button depressed to the ON position.
   2) Battery internal thermostat is shorted to ground.
   3) Press the CHARGE START button to begin charging.

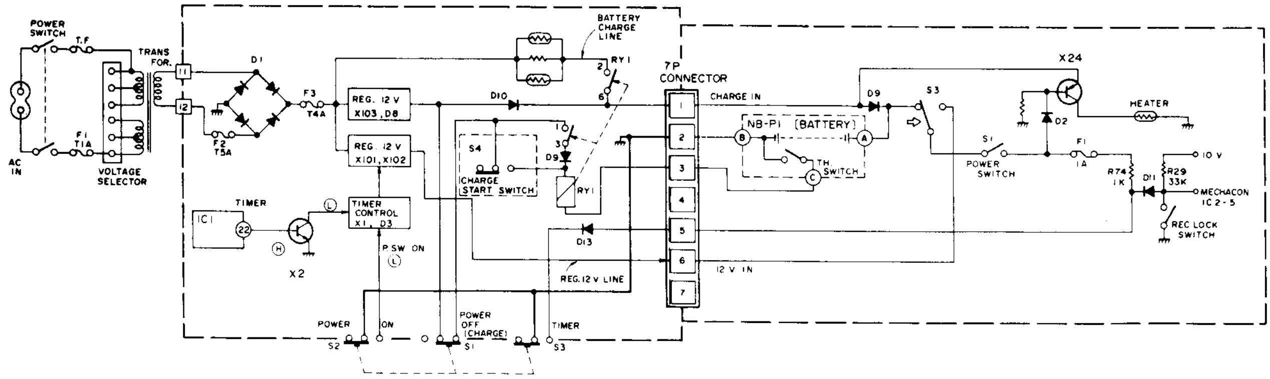

POWER SWITCH
T.F
TRANS FOR.
AC IN
F1 T1A
VOLTAGE SELECTOR
11
12
D1
F2 T5A
F3 T4A
REG. 12 V X103, D8
REG. 12 V X101, X102
BATTERY CHARGE LINE
RY1
2
6
1
3
D10
D9
S4
CHARGE START SWITCH
TIMER
IC1
22
H
L
X2
TIMER CONTROL X1, D3
P.SW ON
D13
REG. 12 V LINE
POWER
ON
POWER OFF (CHARGE)
TIMER
S2
S1
S3
7P CONNECTOR
1
2
3
4
5
6
7
CHARGE IN
12 V IN
NB-P1 (BATTERY)
B
A
C
TH. SWITCH
X24
S3
D2
HEATER
S1
POWER SWITCH
F1
1A
R74 1K
D11
R29 33K
10 V
MECHACON IC2-5
REC LOCK SWITCH

Fig. 3-27 VP-77EG/EK + VU-77EG/EK

3. VP-77EG/EK + VA-77EG/EK (charging 2 batteries)
   1) With internal thermostats of both batteries grounded and the POWER button of the VP-77EG/EK OFF (raised position), press the CHARGE START button of the VA-77EG/EK to begin charging. The battery in the VP-77EG/EK is charged first (selected by relay RY1 contacts 2, 13, and 14).
   2) After completion of the VP-77EG/EK battery charging, the battery of the VA-77EG/EK begins charging.
   3) While charging is in progress, pressing the VP-EG/EK POWER button to ON interrupts charging. To resume charging, set the VP-77EG/EK POWER button to OFF and again press the CHARGE START button of the VA-77EG/EK.

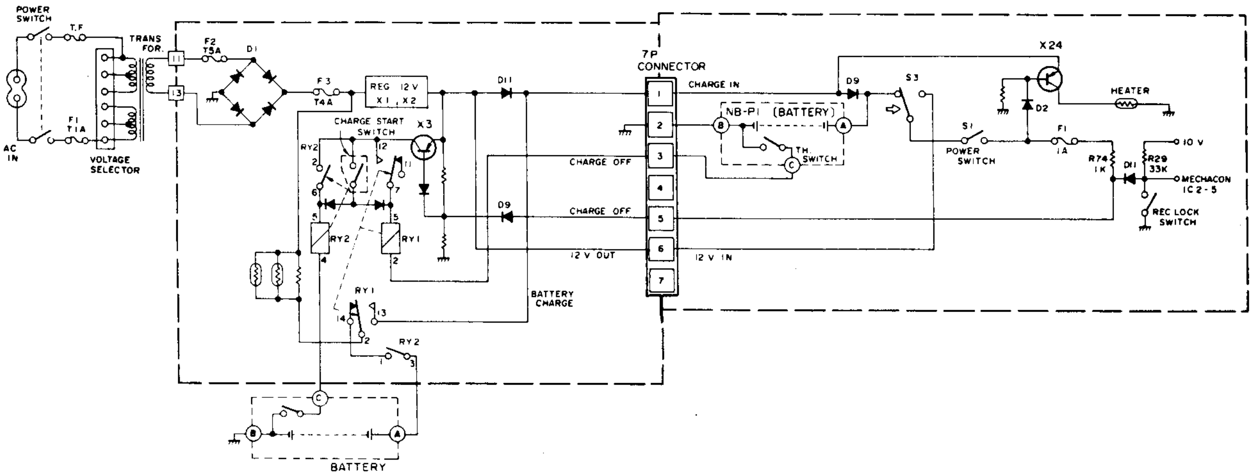
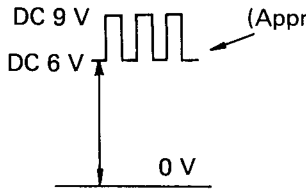
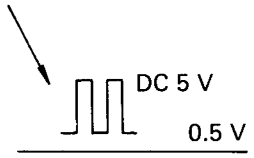
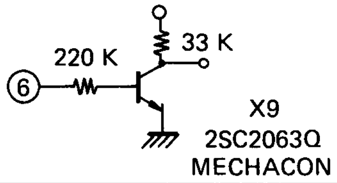

POWER SWITCH
T.F
TRANS FOR.
F2 T5A
D1
F1 T1A
AC IN
VOLTAGE SELECTOR
11
13
F3 T4A
REG 12 V X1, X2
D11
CHARGE START SWITCH
X3
RY2
2
6
12
11
7
5
RY2
RY1
4
2
D9
CHARGE OFF
CHARGE OFF
12 V OUT
RY1
14
13
2
RY2
1
3
BATTERY CHARGE
C
B
A
BATTERY
7P CONNECTOR
1
2
3
4
5
6
7
CHARGE IN
12 V IN
NB-P1 (BATTERY)
TH. SWITCH
D9
S3
X24
D2
HEATER
S1
POWER SWITCH
F1 1A
R74 1K
D11
R29 33K
10 V
MECHACON IC2-5
REC LOCK SWITCH

Fig. 3-28 VP-77EG/EK + VA-77EG/EK

4. Heater operating conditions
   1) When connected to the VU-77EG/EK, with the VU-77EG/EK rear panel POWER switch ON and the VP-77EG/EK POWER button OFF, heater voltage is supplied regardless of the function button positions. In this state, although voltage is also supplied to the battery, two diodes are inserted in series and the voltage becomes approx. 10.8 V. The charging effect is thus negligible.
   2) In the VP-77EG/EK + VA-77EG/EK combination, heater voltage is supplied when the VA-77EG/EK POWER button is ON and the VP-77EG/EK POWER button is OFF.
   3) When the VP-77EG/EK is operated by battery, D9 becomes reverse biased. At this time, heater voltage is not supplied.

3-6-2. 10 pin camera connector

<table>
<tr><th>MODE
PIN NO.</th><th>E-E (STOP, REC, REW, FF)</th><th>P.B.</th></tr>
<tr><td>1</td><td>VIDEO INPUT : 1 Vp-p (75 Ω)</td><td>VIDEO OUTPUT : 2 Vp-p (no load)
Sync Tip = DC 4 V ± 1 V</td></tr>
<tr><td>2</td><td>GND</td><td>GND</td></tr>
<tr><td>3</td><td colspan="2">BATTERY ALARM & TAPE RUN
<table>
<tr><th>Battery alarm
Tape run</th><th>OFF</th><th>ON (*)</th></tr>
<tr><td>Stop</td><td>H (DC 6 V)</td><td>L (DC 1 V)</td></tr>
<tr><td>Run</td><td>
DC 9 V
DC 6 V
0 V
(Approx. 1 Hz)

</td><td>
</td></tr>
</table>
(*) Battery alarm lights battery terminal voltage declines to 11.0±0.2 VDC.</td></tr>
<tr><td>4</td><td>GND (for 5 pin)</td><td>GND</td></tr>
<tr><td>5</td><td colspan="2">AUDIO OUT : 0 dBs (no load) Z out : 100 Ω
Volume should be sufficient with 10 Ω earphone.</td></tr>
<tr><td>6</td><td>START/STOP
High input = Stop (pause)
Low input = Start (rec)

220 K
33 K
⑥
X9
2SC2063Q
MECHACON

</td><td></td></tr>
<tr><td>7</td><td>AUDIO IN : −20 dBs (8 kΩ)</td><td></td></tr>
<tr><td>8</td><td>GND</td><td>GND</td></tr>
<tr><td>9</td><td>GND</td><td>GND</td></tr>
<tr><td>10</td><td>+ 12 V OUT 1 A</td><td>+12 V OUT 1 A</td></tr>
</table>

Table 3-12

SECTION 4

DISASSEMBLY

TABLE OF CONTENTS

4-1. CHASSIS REMOVAL 4-2
4-2. CIRCUIT BOARD REMOVAL 4-3
  4-2-1. PRE/REC 4-3
  4-2-2. Servo 4-3
  4-2-3. Y. amplifier 4-4
  4-2-4. Chroma 4-4
  4-2-5. Mechanism control (Mechacon) 4-4
  4-2-6. Audio & C.P.U. 4-4

4-1. CHASSIS REMOVAL

1. Take out the hook screws and screws ① from both sides, and remove the side plates.
2. Three plastic hooks are located on the inner side of the front panel at roughly the positions of the FF, REC and PAUSE/STILL buttons. Open the bottom of the front panel outward a few degrees, then disengage the hooks to remove the front panel.

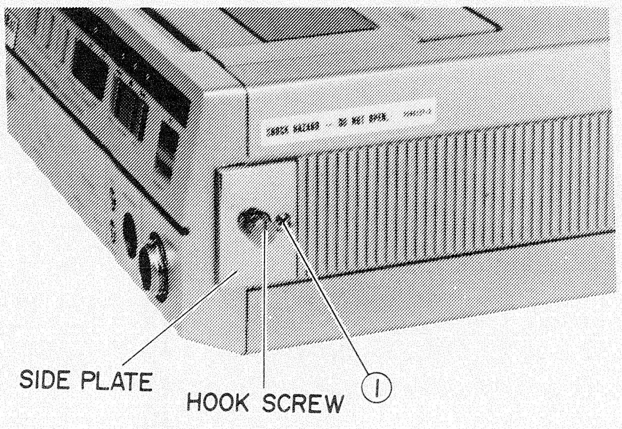


Fig. 4-1

3. Take out screws ② through ④ and remove the feet and the bottom cover.

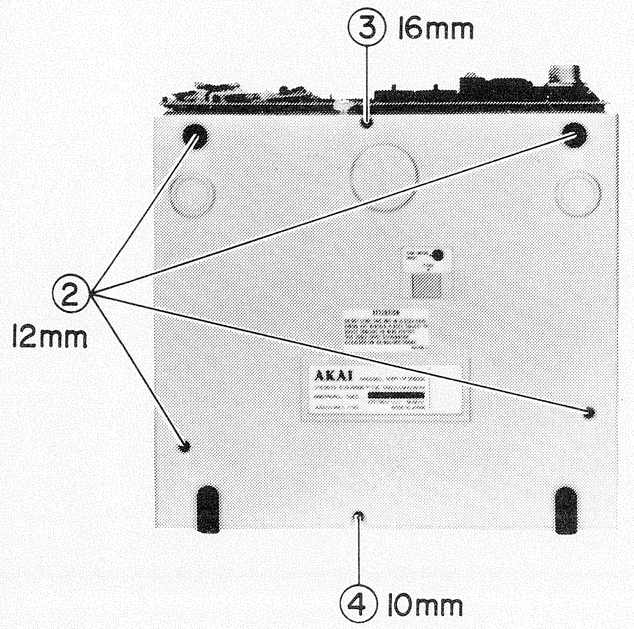


Fig. 4-2 (a)

NOTES:

- After removing the bottom cover, reinstall screws ② in the convex portions to avoid direct contact between the reel motor and circuit board, and the work surface.
- Observe screw lengths when reassembling (Fig. 4-2).

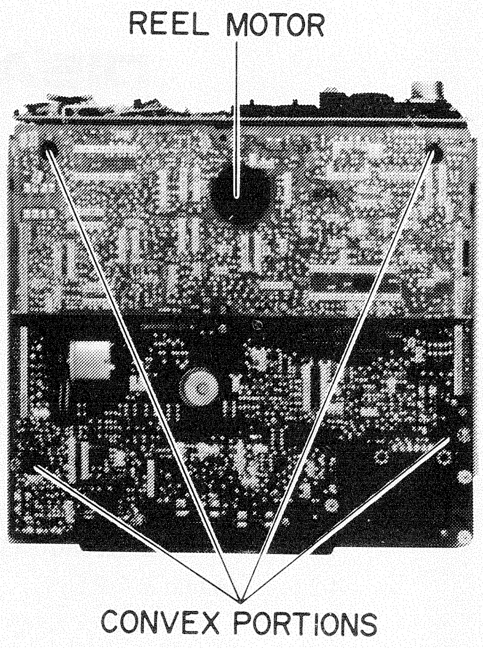


Fig. 4-2 (b)

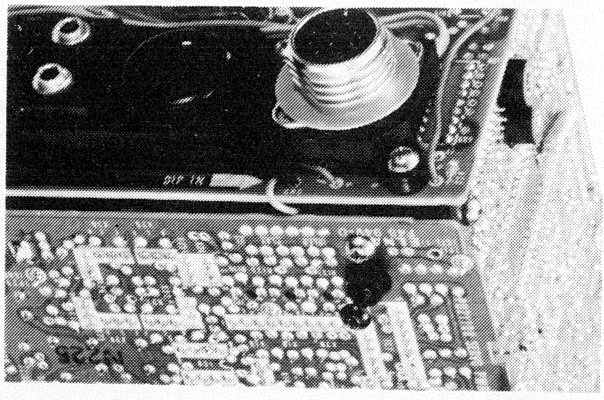


Fig. 4-2 (c)

4. Remove the connector cover.
5. With the cassette housing in the raised position, take out screws ⑤ and remove the top cover.
6. Take out screws ⑥ and remove the shielding plate.

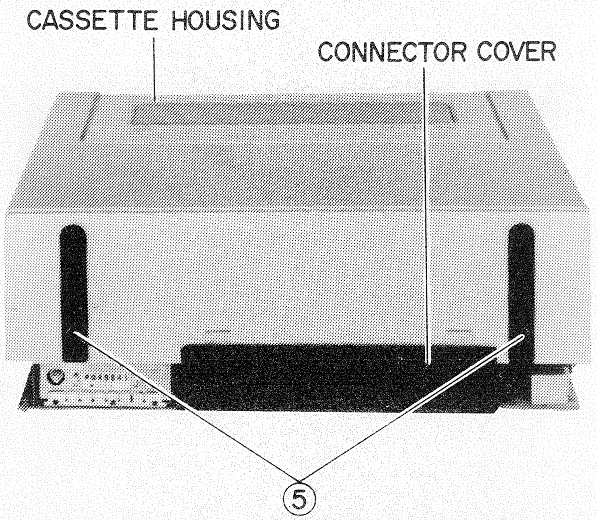

CASSETTE HOUSING
CONNECTOR COVER
⑤

Fig. 4-3 (a)

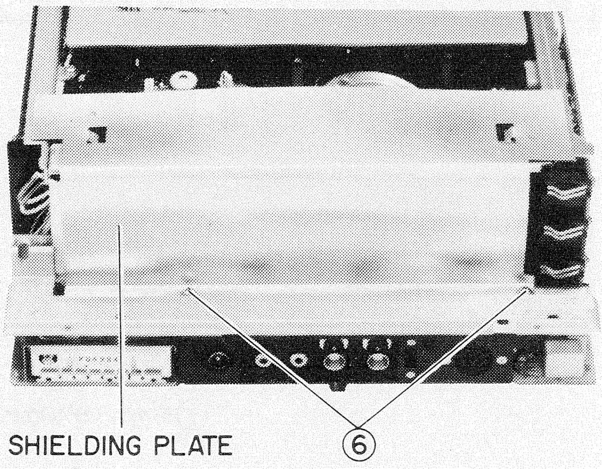

SHIELDING PLATE
⑥

Fig. 4-3 (b)

7. Take out screws ⑦ and remove the cassette cover.

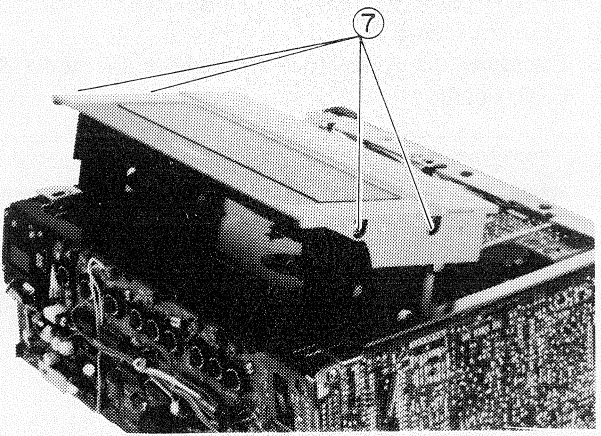


Fig. 4-4

4-2. CIRCUIT BOARD REMOVAL

4-2-1. PRE/REC

1. Take out screws ①.
2. Disengage the connectors and remove the PRE/REC board.

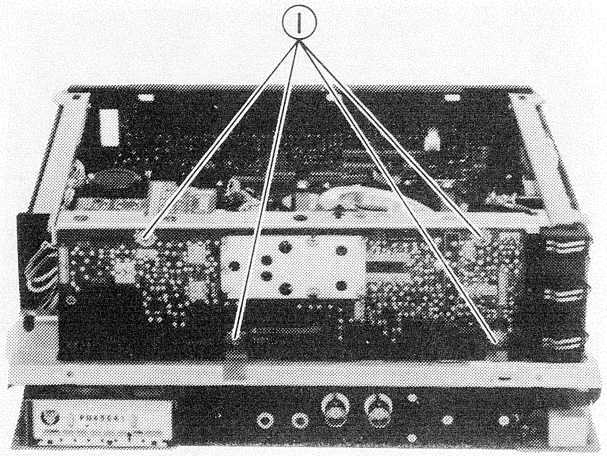


Fig. 4-5

4-2-2. Servo

1. Remove the tracking knobs.
2. Take out screws ②.
3. Disengage the connectors and remove the servo board.

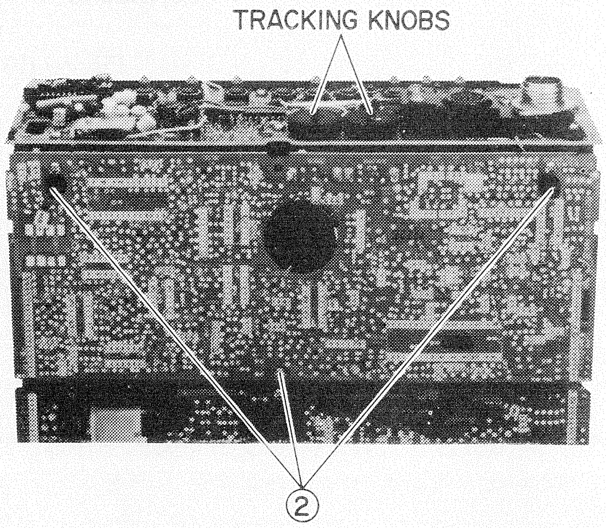

TRACKING KNOBS
②

Fig. 4-6

4-2.3. Y. amplifier

1. Remove screws ③ and screw ④.
2. Disengage the connectors, and remove the Y. amp board.

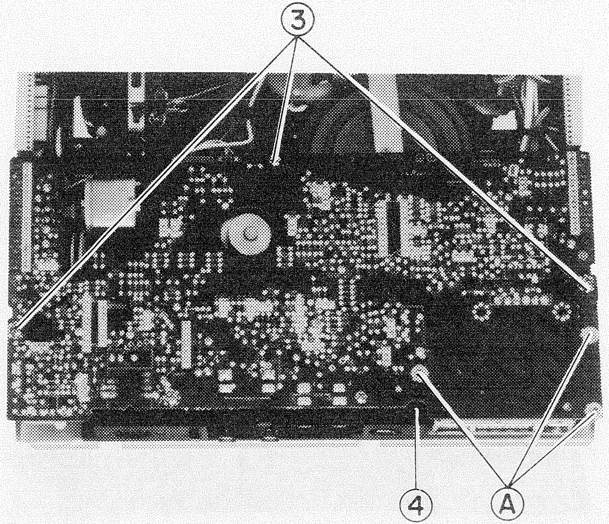


Fig. 4-7 (a)

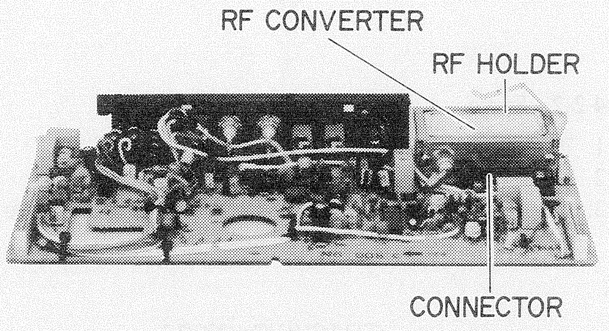


Fig. 4-7 (b)

RF Converter replacement

1. After removing the Y. amp board, take out screws Ⓐ and remove the holder.
2. Disengage the RF converter from the connector.

4-2-4. Chroma

1. Remove the servo and Y. amp boards.
2. Take out screws ⑤.
3. Disengage the connectors and remove the chroma board.

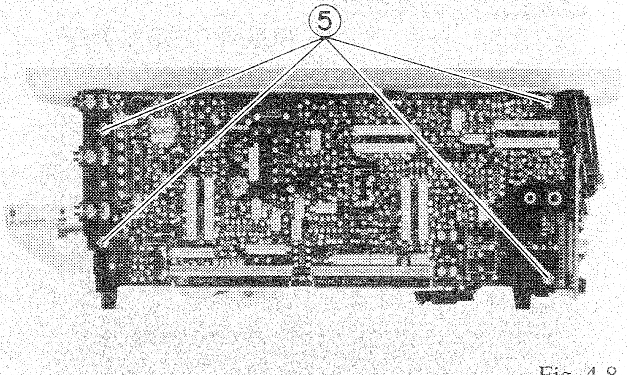


Fig. 4-8

4-2-5. Mechanism control (Mechacon)

1. Remove the servo board.
2. Take out screws ⑥ through ⑧.
3. Disengage the connectors and remove the mechacon board.

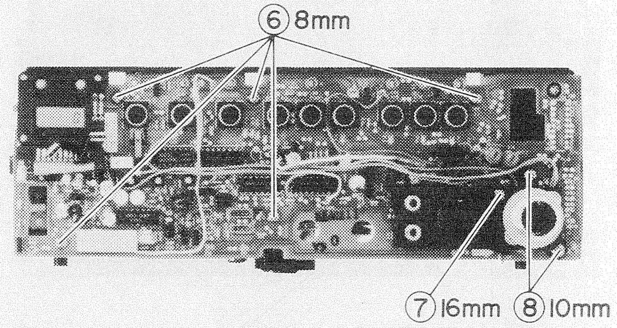


Fig. 4-9

4-2-6. Audio & C.P.U

1. Remove the servo, Y. amp and mechacon boards.
2. Take out screws ⑨.
3. Disengage the connectors and remove the audio & C.P.U board.

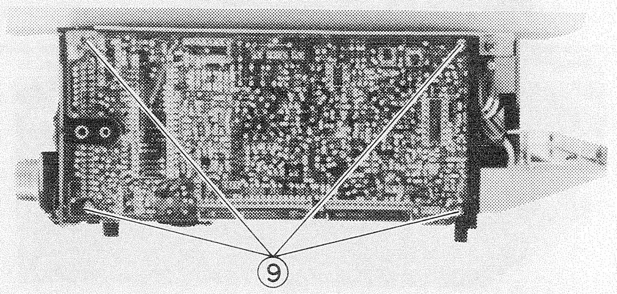


Fig. 4-10

SECTION 5

MECHANICAL ADJUSTMENT

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5-1. GENERAL

The adjustments described in this section are those which can be performed by a qualified service technician. Those which require highly specialized equipment and training (such as replacement of the lower drum) are omitted.

Proper maintenance and inspection are important both for ensuring top performance and preventing damage to the tape. Note that the required jigs must be employed when specified in the adjustment steps.

IMPORTANT:

1. Always turn the power off before removing or soldering components.
2. When removing a screw from the chassis, be careful not to drop it into the mechanism. If a screw should be dropped, be sure to retrieve it.
3. Be extremely careful not to damage either the upper or lower head drum assemblies.
4. The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require readjustment.
5. When removing a part, be very careful not to damage or displace other parts. (Be especially careful with the guide poles and rotary video head drum.)
6. To check the mechanism without the cassette tape, disable the photo transistor sensors by applying an opaque cover to the cassette lamp holder. After completing checks and repairs, be sure to remove the cover.

5-2. REQUIRED JIGS AND TOOLS

For proper mechanical adjustment, the following jigs and tools are strongly recommended. Without them, a long trial-and-error period would be necessary.

In addition, general-purpose tools and a metric hex key are required.
The hex key needed for this model is 1.5 mm size.

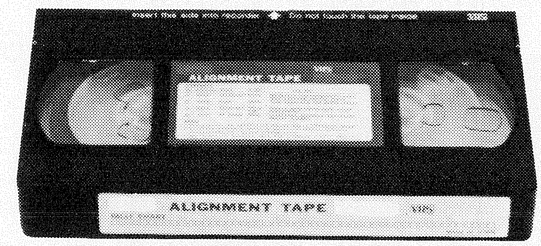
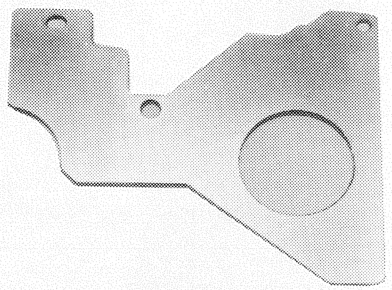
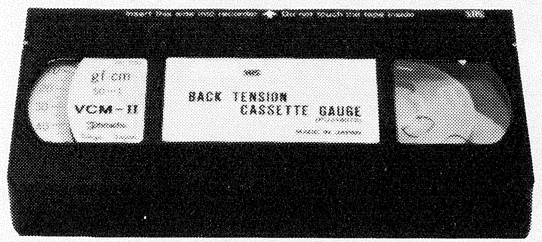
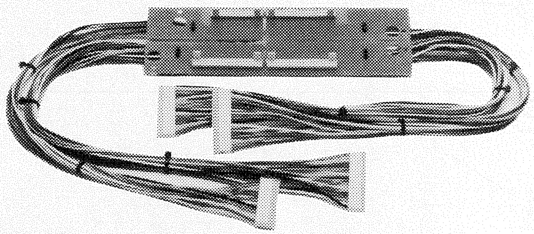
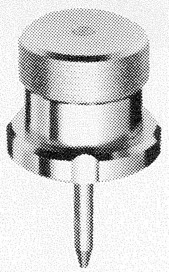
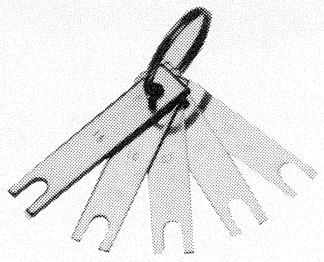
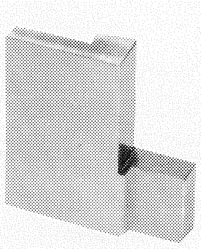
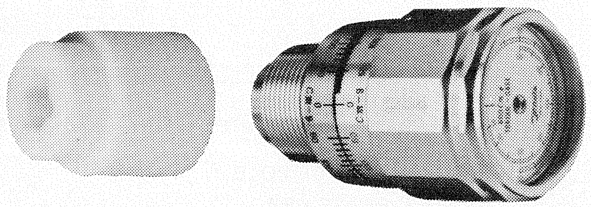
Alignment Tape TF-505MH (PAL)/TF-507MH (SECAM) 	Master Plane MP-003 
Back Tension Adj BT-001 	Patch Cord PC-001 
FG PWB Set FS-002 	Thickness Gauge TG-001 
Height Gauge HG-002 	Torque meter 600ATG TM-002 Torque meter head TM-001 

Fig. 5-1 Jigs and tools

5-3. LAYOUT OF MAIN MECHANICAL PARTS

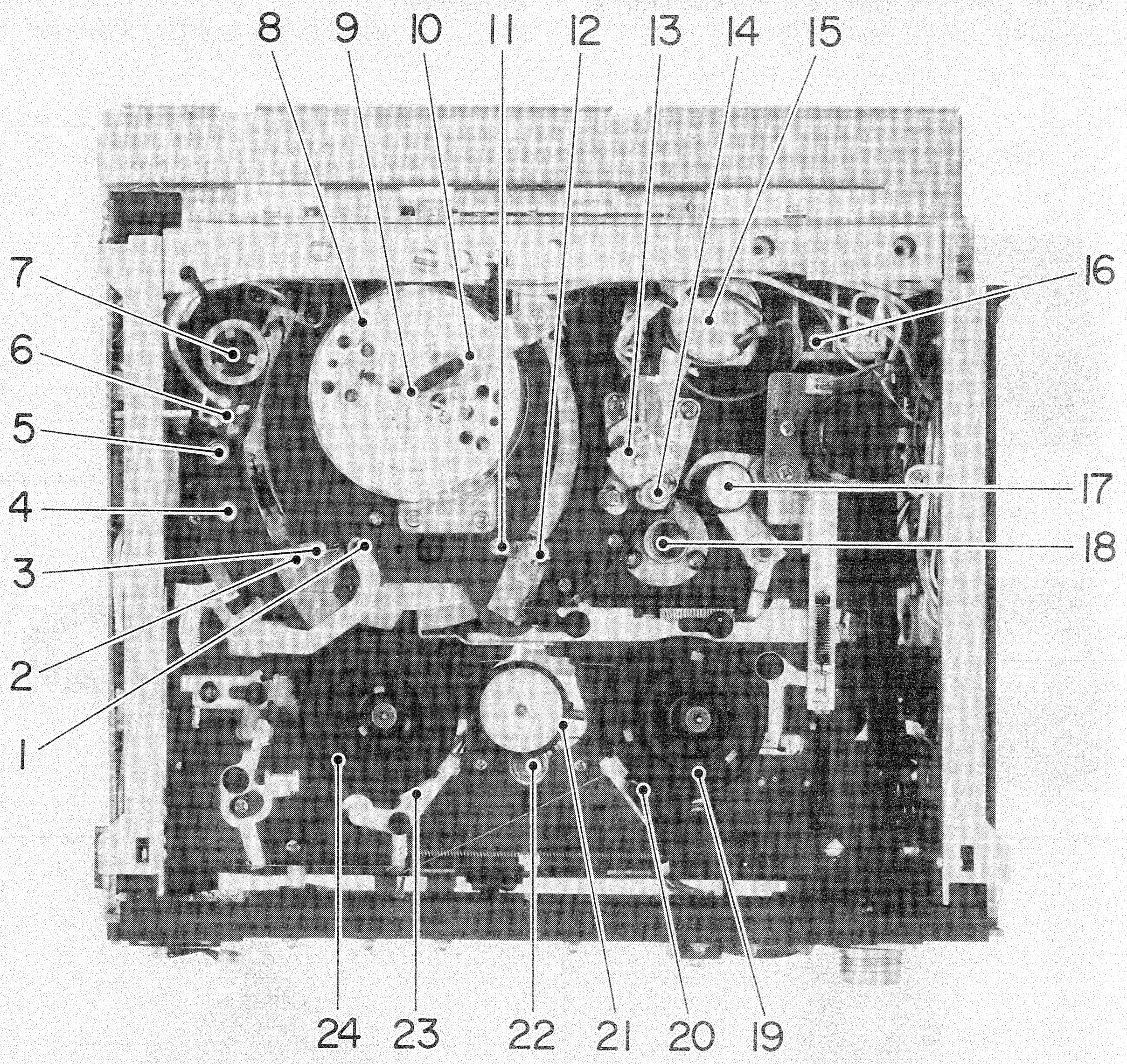


Fig. 5-2 (a) Top view

1. TENSION POLE
2. SUPPLY GUIDE ROLLER
3. SUPPLY SLANT POLE
4. SUPPLY GUIDE PIN
5. SUPPLY GUIDE POLE
6. FULL ERASE HEAD
7. SUPPLY IMPEDANCE ROLLER
8. UPPER DRUM ASS'Y
9. COMMUTATOR
10. BRUSH ASS'Y
11. TAKE-UP SLANT POLE
12. TAKE-UP GUIDE ROLLER
13. AUDIO/CONTROL HEAD ASS'Y
14. TAKE-UP GUIDE POLE
15. CAPSTAN MOTOR ASS'Y
16. PINCH ROLLER SOLENOID
17. PINCH ROLLER
18. CAPSTAN SHAFT
19. TAKE-UP REEL DISK ASS'Y
20. TAKE-UP BRAKE RUBBER TIRE
21. REEL IDLER RUBBER TIRE
22. REEL MOTOR PULLEY
23. SUPPLY BRAKE RUBBER TIRE
24. SUPPLY REEL DISK ASS'Y

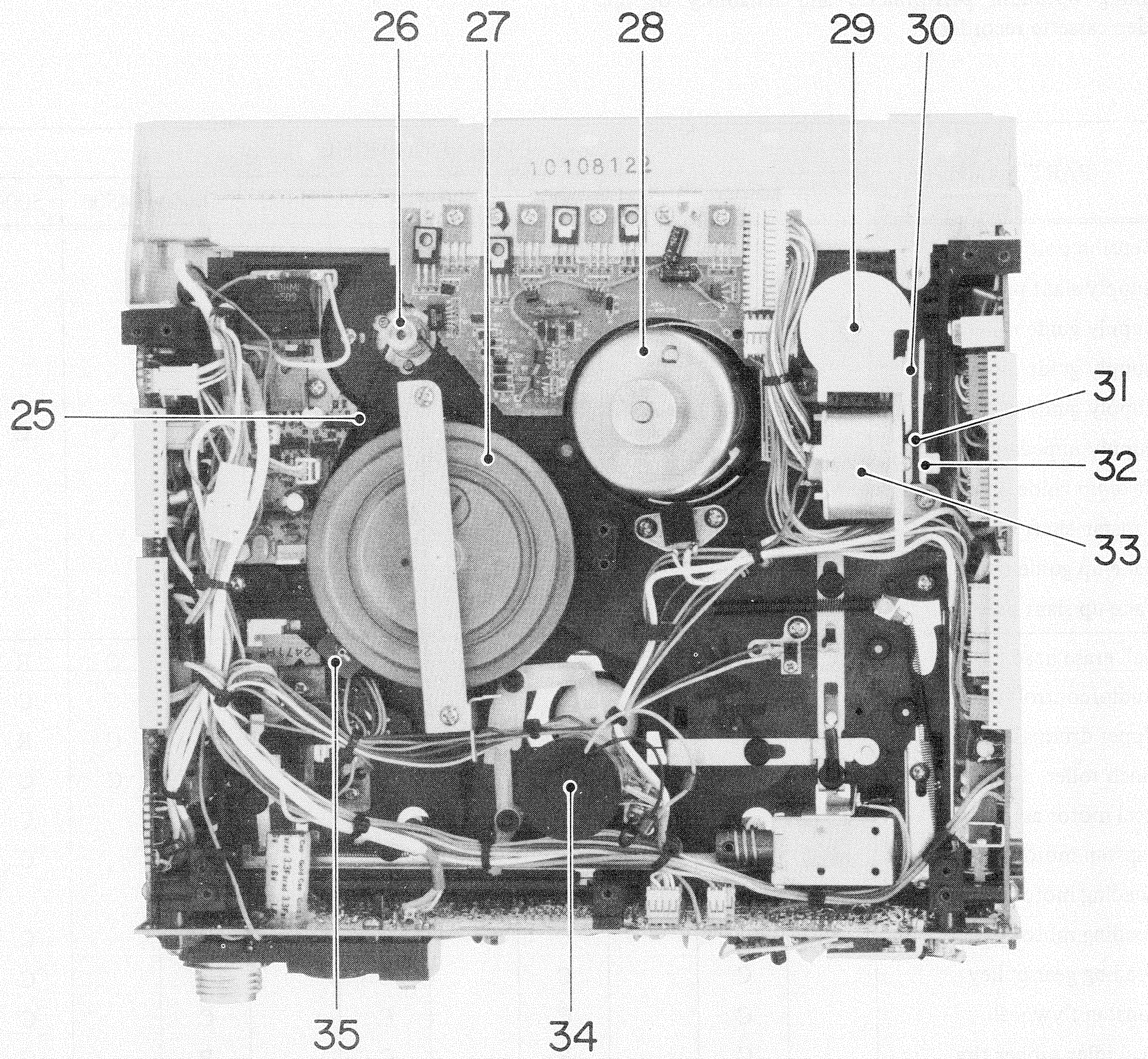

26
27
28
29
30
25
31
32
33
35
34

Fig. 5-2 (b) Bottom view

25. CAPSTAN BELT
26. CAPSTAN MOTOR PULLEY
27. CAPSTAN FLYWHEEL
28. LOWER DRUM ASS'Y
29. LOADING GEAR ASS'Y
30. LOADING GEAR PULLEY
31. LOADING BELT
32. LOADING MOTOR PULEEY
33. LOADING MOTOR
34. REEL MOTOR ASS'Y
35. FG CIRCUIT BOARD

5-4. PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette recorder.

PART NAME	OPERATING HOURS									
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
Tension pole	C	C	C	C	C	C	C	C	C	C
Supply slant pole										
Supply guide roller										
Supply guide pin										
Supply guide pole										
Supply impedance roller										
Take-up guide pole										
Capstan shaft										
Take-up guide roller										
Take-up slant pole										
Full erase head	C	C	C	C	C	C	C	C	C	R
Audio/control head ass'y	C	C	C	C	C	R	C	C	C	C
Upper drum ass'y	C	R	C	R	C	R	C	R	C	R
Pinch roller	C	C	C	C	C	R	C	C	C	C
Reel motor ass'y		C		R		C		R		C
Capstan motor ass'y		C		R		C		R		C
Loading motor						R				
Loading motor pulley		C		C		C		C		C
Loading gear pulley		C		C		C		C		C
Capstan flywheel		C		C		C		C		C
Reel idler rubber tire		C		R		C		R		C
Supply brake rubber tire		C		R		C		R		C
Take-up brake rubber tire		C		R		C		R		C
Capstan belt		C		R		C		R		C
Loading belt		C		R		C		R		C
Supply reel disk ass'y		C		C/L		C		C/L		C
Take-up reel disk ass'y		C		C/L		C		C/L		C
Brush ass'y		C		R		C		R		C
Commutator		C		R		C		R		C
Supply tension brake ass'y				R				R		
Take-up tension brake ass'y				R				R		
Tension band ass'y				R				R		

Key to abbreviations: C : Cleaning
L : Lubrication
R : Replacement

Table 5-1 Periodic maintenance

5-4-1. Cleaning

1. For cleaning parts except the video heads, use gauze or lint-free cloth dampened with alcohol.
2. When cleaning video heads, use a separate lint-free cloth dampened with alcohol.
3. When cleaning the two video heads on the upper drum, do not clean them with a vertical stroke.
   Use only a gentle back and forth mortion in the direction of the tape path.
   Use care since they are easily damaged.
4. When cleaning rubber and plastic parts, avoid using excessive alcohol since it may accelerate deterioration of these parts.
5. After cleaning with alcohol, allow the parts to dry thoroughly before using a cassette tape.

5-4-2. Lubrication

The following components should lubricated with AKAI oil after every 2000 hours of use.

1) Shaft of the take-up reel disk
2) Shaft of the supply reel disk

After cleaning above shafts with alcohol, lubricate these shafts with one or two drops of AKAI oil.
Do not over lubricate.

5-4-3. Periodically replaced parts

The replacement periods of the parts shown in Table 5-1 are typical for equipment that is used in accordance with the instruction manual. Note that the times may vary considerably according to environmental and usage conditions. As a rule, inspect these components whenever performing major service on the machine and replace those which show obvious signs of wear or deterioration.

5-5. MAIN ASSEMBLY REPLACEMENTS

5-5-1. Cassette housing

1. With the cassette housing in the lowered position, disengage the springs from the left and right spring rollers.
2. Gently spread the springs outward and use a magnetic tipped screwdriver to take out screws A.
3. Lift the cassette housing upward and while pressing the release lever, lightly press in the REC safety lever. At this time, lift the cassette housing upward toward the left side. In this manner, carefully remove the cassette housing.
4. Reinstall with the housing in the raised configuration.
5. Gently insert the right side of the cassette housing first and while pressing the release lever, insert the left side. At this time, use care that left stand of the housing does not deform the earth spring at the upper left corner of the frame.
6. Lower the cassette housing. Observe that the main deck bosses are properly seated in the positioning holes of the cassette housing stands, then reinstall screws A.

NOTE: If screws Ⓐ are tightened while the bosses are not properly seated, the bosses can be damaged and prevent correct positioning of the cassette housing.

7. Re-engage the springs with the spring rollers.

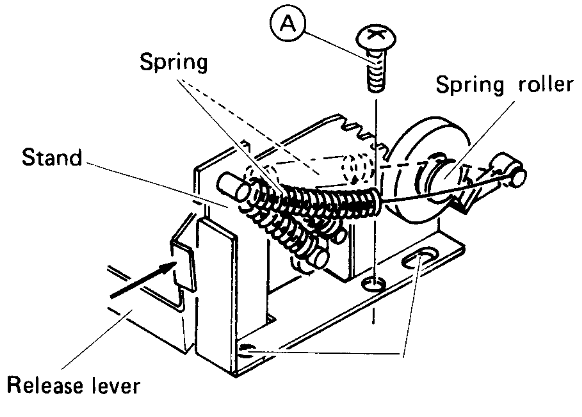


Fig. 5-3 Cassette housing replacement

5-5-2. Upper drum and brush assemblies/commutator

1. Take out screw Ⓐ and remove the brush assembly. See Fig. 5-4.
2. Remove the commutator from the drum motor shaft.
3. Unsolder the 4 wires coming from the lower drum assembly (perform quickly to avoid damaging the wires).
4. Take out screws Ⓑ and remove the upper drum assembly in the upward direction.
5. Use alcohol to clean the lower face of the new upper drum assembly and the flywheel face of the lower drum assembly. When handling and installing the new upper drum, avoid directly touching the video heads and use care not to scratch the drum.

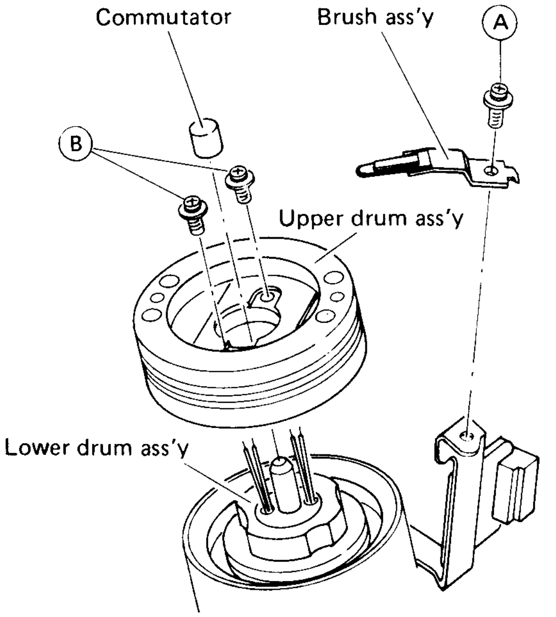


Fig. 5-4 Upper drum and brush/commutator replacements

6. Reassemble by reversing the above steps. Observe the correct channels when resoldering the wires (brown: CH-1; red: CH-2). Avoid overheating the wires when resoldering. Observe that the brush assembly contacts the central portion of the commutator.
7. Perform the following checks and adjustments (described in the section 6, electrical adjustments).
   1) Playback switching point (section 6-4, step 12)
   2) Recording switching point (section 6-4, step 13)
   3) Tracking preset (section 6-4, step 16)
   4) Video head resonance and Q (section 6-5, step 1)
   5) P.B. color level (section 6-5, step 2)
   6) Overall checks and adjustments of the signal systems.

5-5-3. Audio/control head subassembly

1. Take out screws Ⓐ, Ⓑ and Ⓒ to remove the A/C head subassembly. Use care regarding the coil springs as shown in Fig. 5-5.
2. Remove the A/C head circuit board. Use care not to damage the wires.
3. Replace the A/C head subassembly and reassemble by reversing the above steps.

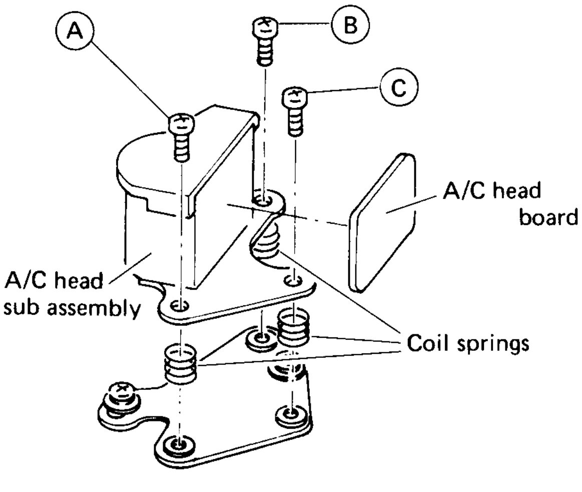


Fig. 5-5 A/C head replacement

4. Perform the following checks and adjustments.

A: Tape transport adjustment

1. Employ cassette tape and set for Play mode.
2. Turn audio/control head screw Ⓒ (Fig. 5-6) and adjust for smooth transport at the take-up guide pole. Do not adjust the height of the take-up guide pole itself.

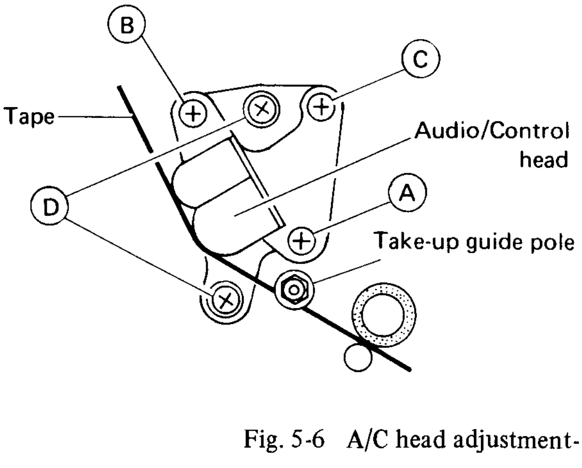


Fig. 5-6 A/C head adjustment-1

B: Audio/control head height and azimuth

1. Connect oscilloscope to Audio TP-2 (Audio out), and play alignment tape (6 kHz and stairstep signals).
2. Turn screws Ⓐ, Ⓑ and Ⓒ (Fig. 5-6) in succession by small and equal increments at a time and adjust for maximum audio output level as shown in Fig. 5-7. With reference to screw Ⓐ, adjust azimuth with screw Ⓑ and adjust screw Ⓒ so that small tape wrinkles at not produced at the guide poles, but at the same time, audio output becomes maximum and level fluctuations minimum. It is suggested to first turn screw Ⓐ by a small amount, then turn screws Ⓑ and Ⓒ by an equal amount and set for maximum output.
3. Carefully and evently adjust screws Ⓐ, Ⓑ and Ⓒ to align the audio/control head height with the tape as shown in Fig. 5-8.

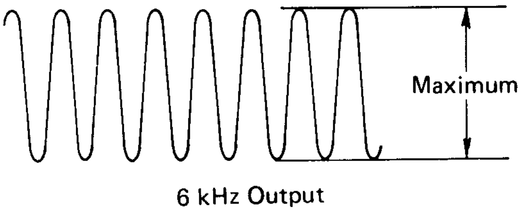

Maximum
6 kHz Output

Fig. 5-7 Audio output level

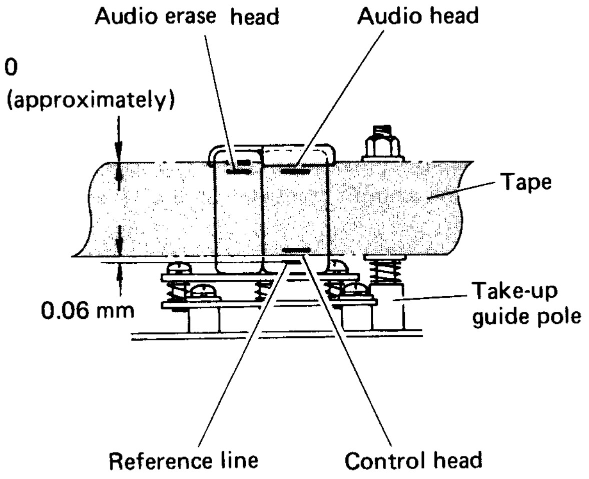

Audio erase head
Audio head
0
(approximately)
Tape
Take-up
guide pole
0.06 mm
Reference line
Control head

Fig. 5-8 A/C head adjustment-2

C: Audio/control head inclination

1. Set the height gauge as shown in Fig. 5-9. Check for space t of 0 ± 0.05 mm. If not within this range, adjust according to the above steps.

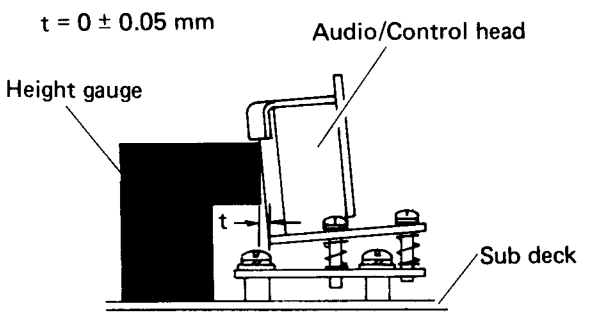

t = 0 ± 0.05 mm
Audio/Control head
Height gauge
t
Sub deck

Fig. 5-9 A/C head inclination

D: Final checks/adjustments

Check according to the following steps.

1. Playback control pulse (see section 6-4, step 11).
2. Control head phase (see section 6-4, step 27).
3. Audio recording and playback levels and the audio circuit (see section 6-7).

5-5-4. Lower drum assembly

1. For considerations of reliability, the drum motor and lower drum assembly should be replaced simultaneously.
2. Disengage the connector from the lower drum assembly (from the bottom side).
3. Remove the Pre/Rec board (see Section 4-2-1) and the upper drum assembly (Section 5-5-2).

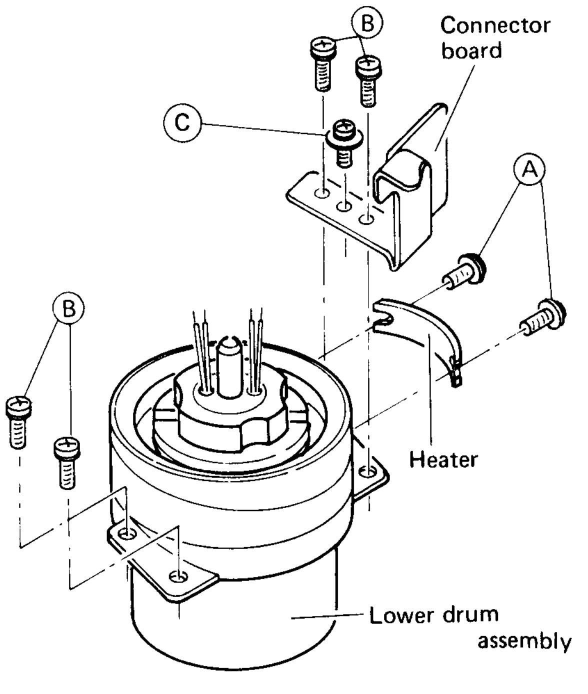

Ⓑ
Connector
board
Ⓒ
Ⓐ
Ⓑ
Heater
Lower drum
assembly

Fig. 5-10 Lower drum replacement

4. Unsolder the 4 wires from the connector board.
5. Take out screws Ⓐ and remove the heater from the lower drum assembly.
6. Take out screws Ⓑ and screws Ⓒ, remove the board bracket and replace the lower drum assembly.
7. Reassemble by reversing the above steps. Use care to resolder the connector board wires in their proper positions.
8. Perform the following checks and adjustments.
    1) Drum servo circuit (Section 6-4).
    2) Interchangeability (Section 5-8).
    3) The checks and adjustments following upper drum assembly replacement (listed in Step 7 of Section 5-5-2).

5-5-5. Reel motor assembly

1. Before replacing the reel motor assembly, carefully observe its mounting condition (particularly wire polarities, clamping and motor band positioning).
2. Take out screws Ⓐ from the top side and remove the reel motor assembly.
3. Unsolder the motor wires from the feed through capacitor and remove the ferrite beads.
4. Take out screws Ⓑ and remove the motor holder from the reel motor assembly.
5. Loosen screw Ⓒ and remove the motor band assembly, and replace the reel motor assembly.
6. Reassemble by reversing the above steps. To compensate for screw play, mount the motor in the most rearward position, then tighten the screws firmly. Use care regarding the polarity of the motor wires and that the motor band assembly does not contact other parts or the chassis.
7. Perform torque adjustment (section 5-6-6).

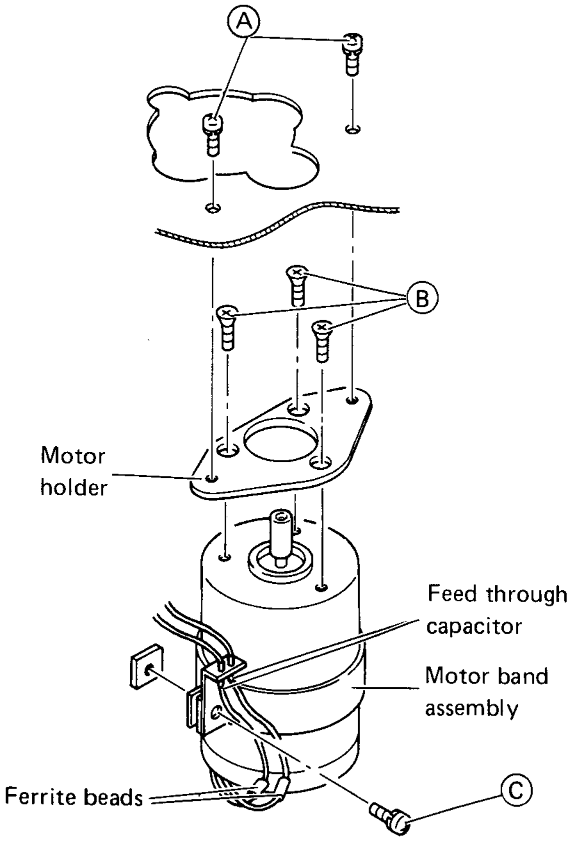


Fig. 5-11 Reel motor replacement

5-5-6. Loading motor

1. Before replacing the loading motor, carefully observe its mounting condition (particularly wire polarities, positioning and clamping).
2. Take out screws Ⓐ and remove the loading gear assembly.
3. Unsolder the wires from the motor terminals.
4. Disengage the belt from the pulley, take out screws Ⓑ and remove the loading motor from the loading gear assembly.
5. Loosen the setscrew, remove the motor pulley and replace the loading motor.
6. Reassemble by reversing the above steps. Use a 0.5 mm thickness gauge to mount the motor pulley. Turn the loading rings by hand to end of travel (loading end position) and install the loading gear assembly.
    After completing replacement, turn the loading motor by hand to restore the loading ring positions.

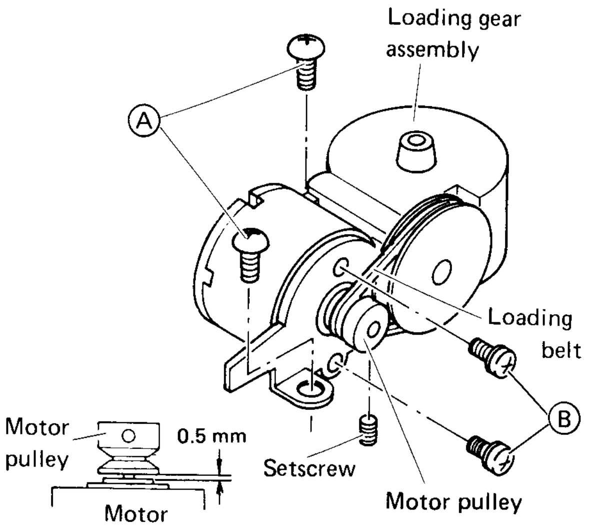


Fig. 5-12 Loading motor replacement

5-5-7. Capstan motor assembly

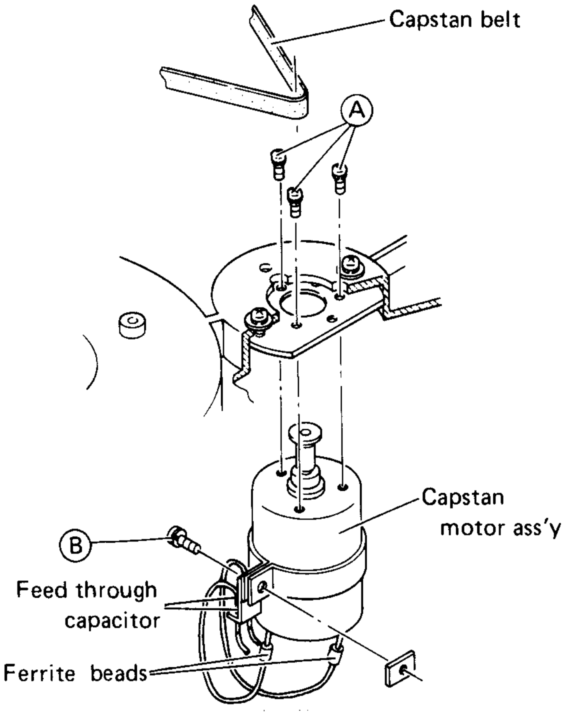

Capstan belt
Ⓐ
Capstan motor ass'y
Ⓑ
Feed through capacitor
Ferrite beads

Fig. 5-13 Capstan motor replacement

1. Before replacing the capstan motor, carefully observe its mounting condition (particularly wire polarities, clamping and motor band positioning).
2. Disengage the belt, take out screws Ⓐ from the bottom side and remove the capstan motor assembly.
3. Unsolder the motor wires from the feed through capacitor and remove the ferrite beads.
4. Loosen screw Ⓑ, remove the motor band assembbly and replace the capstan motor assembly.
5. Reassemble by reversing the above steps. Use care that the motor band assembly does not contact other parts or the chassis.
6. Perform capstan servo circuit adjustments (Section 6-4).

5-5-8. Pinch roller solenoid

1. Disengage the connector of pinch solenoid wires from the Audio & CPU board assembly.
2. Unhook spring-1 to free the pinch slide plate.
3. Take out screw Ⓐ and remove the terminal board.

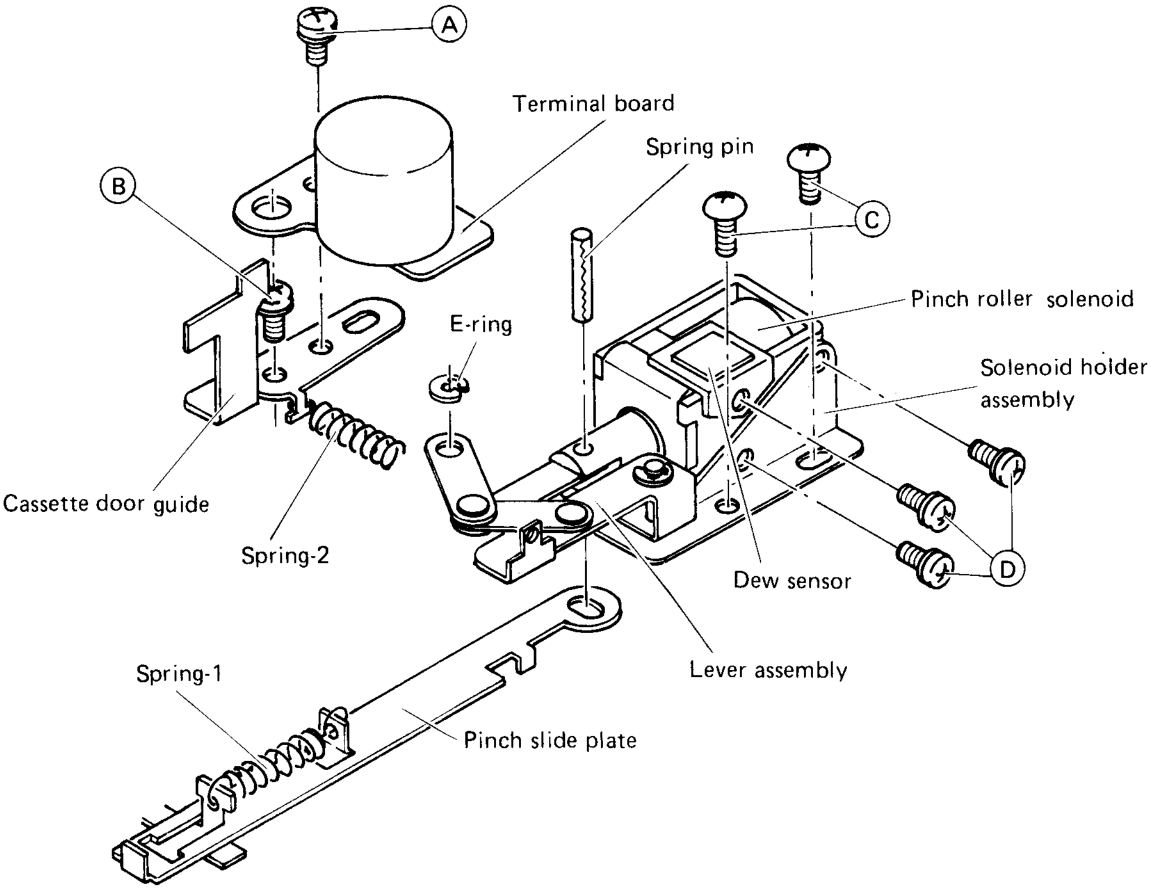

Ⓐ
Terminal board
Spring pin
Ⓒ
Ⓑ
Pinch roller solenoid
E-ring
Solenoid holder assembly
Cassette door guide
Spring-2
Ⓓ
Dew sensor
Spring-1
Lever assembly
Pinch slide plate

Fig. 5-14 Pinch roller solenoid replacement

4. Unhook spring-2 from the lever assembly, take out screw Ⓑ and remove the cassette door guide.
5. Take off the E-ring, take out screws Ⓒ and remove the pinch roller solenoid assembly.
6. Take out screws Ⓓ, remove the dew sensor and solenoid holder assemblies.
7. Pull out the spring pin from the lever assembly; replace the pinch roller solenoid.
8. Reassemble by reversing the above steps. Mount the solenoid in the forwardmost position, then tighten the screws firmly.

5-5-9. FG (frequency generator) P.W.B.

1. Take out screws Ⓐ and remove the bracket assembly.

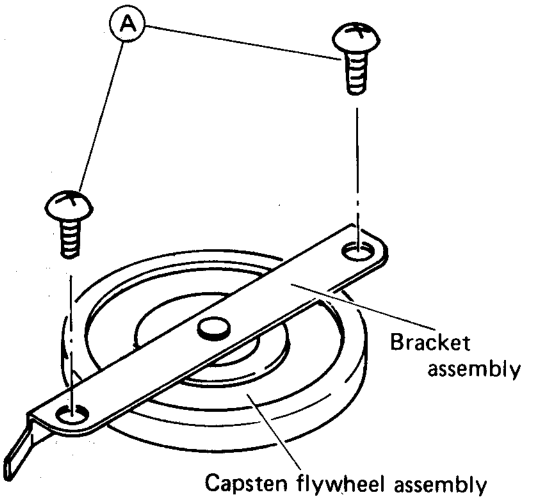


Fig. 5-15 Capstan flywheel replacement

2. Disengage the belt and remove the capstan flywheel assembly (use care regarding the shield cap).
3. Take out screws Ⓑ, unsolder the wires, and remove the FG P.W.B.
4. Install the new FG P.W.B. by reversing the above steps. Use the FG P.W.B. setting jig to obtain proper positioning. After mounting the capstan flywheel, install the shield cap and clean the capstan shaft thoroughly with alcohol.
5. Confirm capstan FG level (Section 6-4, step 2).

5-6. TAPE TRANSPORT SYSTEM CHECKS AND ADJUSTMENTS

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following steps are therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.

Before proceeding, remove the cassette housing (see section 5-5-1) and cover the tape start and end sensors with opaque material. Be sure to remove the covers after completing adjustment.

5-6-1. Master plane jig setting

1. Be sure to use the master plane jig part number MP-003 for this machine.
2. As shown in Fig. 5-17, position the master plane jig with respect to the reference shaft, pinch roller shaft and the stud.

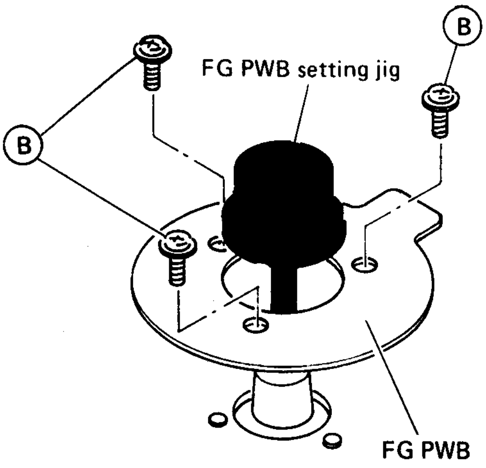


Fig. 5-16 FG P.W.B. setting jig

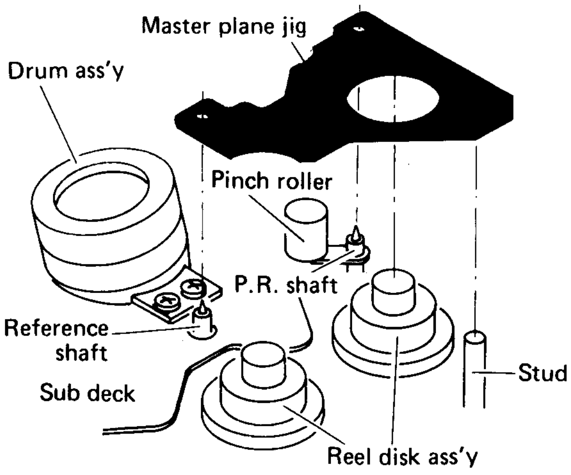


Fig. 5-17 Master plane jig

5-6-2. Reel disk height

1. Set the master plane jig.
2. Use the height gauge (HG-002) to check the reel disk assembly height. Measure at 2 places 90° apart. (The earlier reel disk height adjustment jig, Part No. RH-001, is not used with this model.)
3. The correct height is between planes A and B, as shown in Fig. 5-19. If it is necessary to adjust the height, add or subtract the required number of height adjusting washers.
4. If replacing the reel disk assembly, apply a small amount of oil to the shaft.

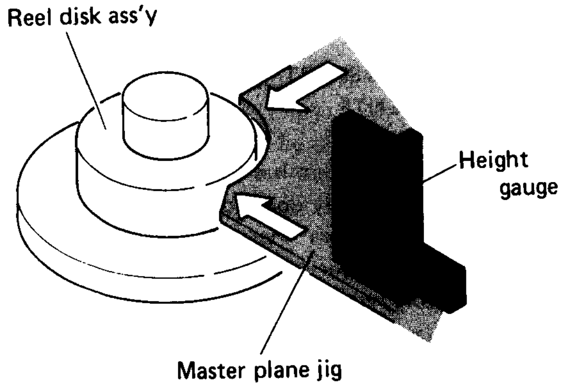

Reel disk ass'y
Height gauge
Master plane jig

Fig. 5-18 Reel disk height adjustment-1

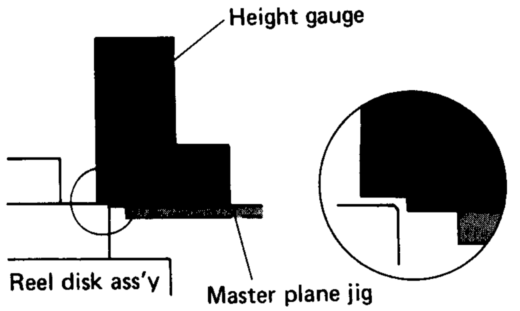

Height gauge
Reel disk ass'y
Master plane jig

Fig. 5-19 Reel disk height adjustment-2

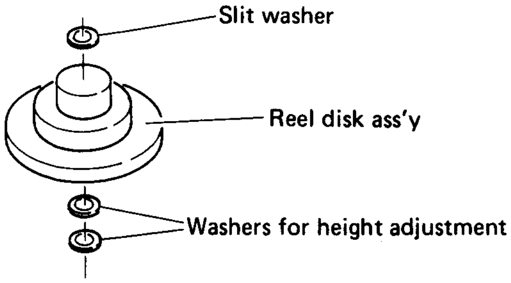

Slit washer
Reel disk ass'y
Washers for height adjustment

Fig. 5-20 Washers for height adjustment

5-6-3. Guide poles and full erase head

1. Set the height gauge (HG-002) on the sub deck and check the perpendicularity.
2. For each guide pole, check the height of the lower face of the upper flange. If necessary, carefully adjust by turning the nut.
3. If guide pole height has been adjusted, tape transport operation checks are required (see section 5-7).

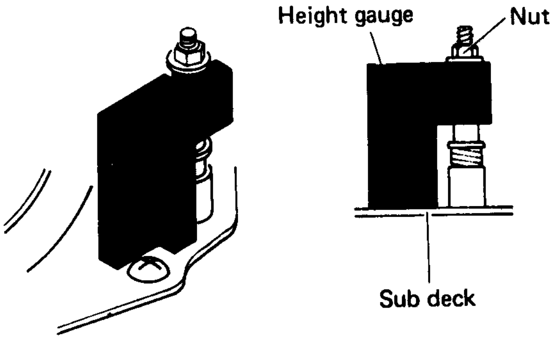

Height gauge
Nut
Sub deck

Fig. 5-21 Guide pole height adjustment

5-6-4. Pinch roller

1. Set the master plane jig and use the height gauge.
2. Supply power and set for the Play mode. After the pinch roller contacts the capstan shaft, check for parallel between plane a – a' of the height gauge and c – c' of the pinch roller with respect to the tape running direction. If necessary, adjust by bending the pinch roller arm assembly.
3. While in the Play mode, cut off the power to separate the pinch roller from the capstan shaft.
4. Check for parallel between planes b – b' of the capstan shaft and c – c' of the pinch roller with respect to the pinch roller pressing direction. If required, adjust by bending the pinch roller arm assembly.

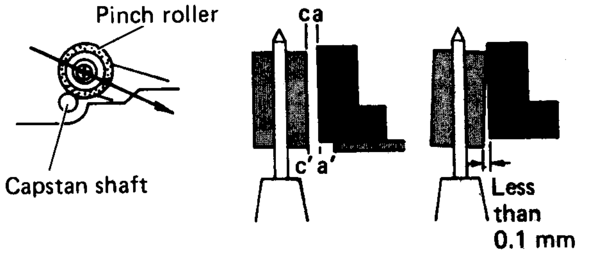

Pinch roller
ca
c'a'
Capstan shaft
Less than 0.1 mm

Fig. 5-22 Pinch roller parallel-1

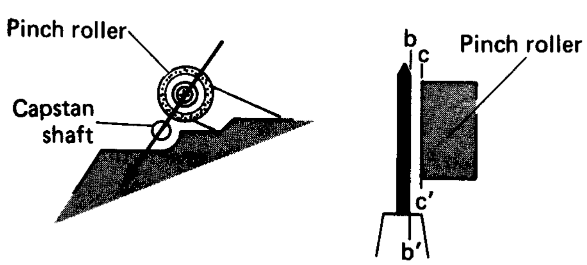

Pinch roller
Capstan shaft
b
c
Pinch roller
c'
b'

Fig. 5-23 Pinch roller parallel-2

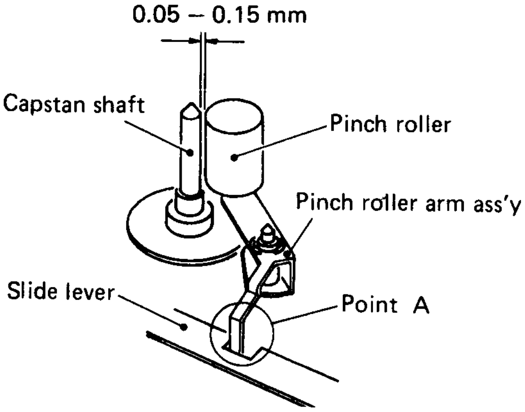

0.05 – 0.15 mm
Capstan shaft
Pinch roller
Pinch roller arm ass'y
Slide lever
Point A

Fig. 5-24 Pinch roller spacing

5. Check for 0.05 to 0.15 mm spacing between the pinch roller and capstan shaft. If necessary, adjust by bending point A of the pinch roller arm as shown in Fig. 5-24.
6. Supply power and return to the Stop mode.

5-6-5. Tension pole position and back tension

1. Set the height gauge on the sub-deck and check the perpendicularity of the tension pole.
2. At the beginning portion of 120 minute tape, set for the Play mode.
3. Check for the relationship shown in Fig. 5-25 between tension pole center and the sub-deck cutout. If necessary, loosen screw Ⓐ and adjust the bracket position.
4. Use the back tension cassette gauge and set for the Play mode.
5. Check that back tension is 23 ± 5 g-cm. If necessary, loosen screw Ⓑ (this requires removing the SERVO board) and turn screw Ⓒ to adjust the spring hook position.
6. Again check the tension pole position.

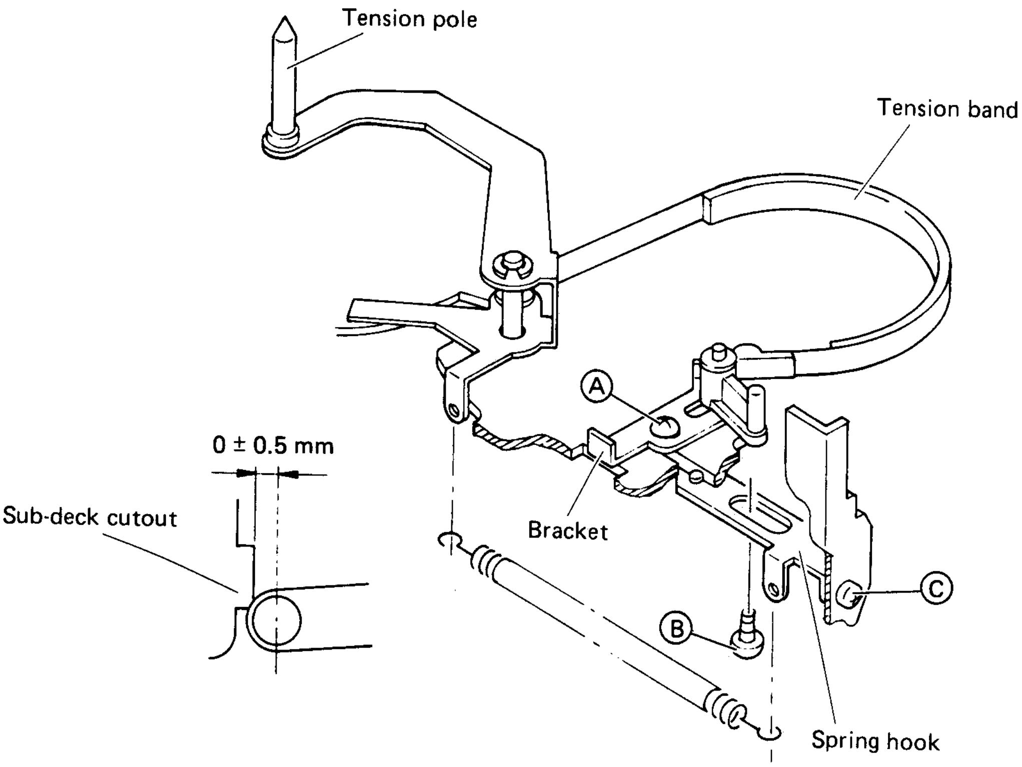

Tension pole
Tension band
Ⓐ
0 ± 0.5 mm
Sub-deck cutout
Bracket
Ⓒ
Ⓑ
Spring hook

Fig. 5-25 Back tension mechanism

5-6-6. Torque (take-up, unloading, FF/REW)

NOTE: It is suggested to extend the SERVO board by using the patch cord (Part No. PC-001), since this would allow both adjustments and checks.

1. Apply the torque gauge to the take-up reel disk and set for the Play mode.
2. Grasp the torque gauge loosely and gradually turn it so that the scale and needle move simultaneously, then read the indication.
3. Check for take-up torque between 60 and 120 g-cm. If necessary, adjust R135 (PLAY) of the SERVO board to obtain 80 g-cm. At this time, terminal 102 is approx. 2.3 VDC.

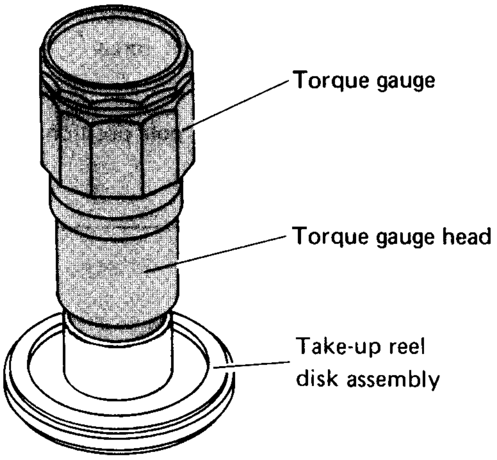


Fig. 5-26 Take-up torque

4. Connect digital voltmeter to terminal 103 of the SERVO board.
5. Adjust R136 (UL) of the SERVO board to obtain 2.5 VDC during the unloading mode.
6. Connect digital voltmeter to terminal 102 of the SERVO board and set for the FF mode without a cassette tape.
7. Adjust R138 (FF/REW) of the SERVO board to obtain 9.0 VDC.
8. Check that the 120 minute tape becomes wound completely within 5 minutes.

5-7. TAPE TRANSPORT OPERATION

5-7-1. Tape transport check

1. Employ cassette tape and operate the machine between Play and Stop modes several times.
   Check according to the following steps.
2. During Play mode, observe tape at the input and output portions (A and B in Fig. 5-27) of the head drum lead.
   Confirm that the tape slips neither upward nor downward with respect to the lead as shown in Fig. 5-28.

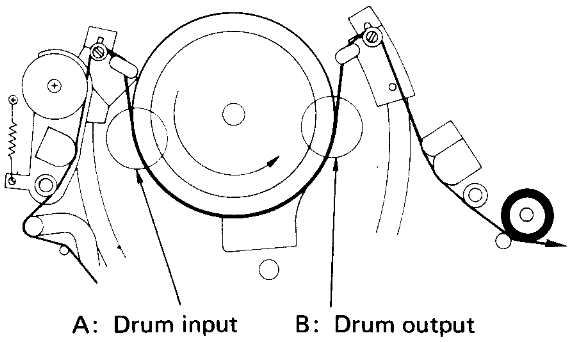


Fig. 5-27 Tape transport check

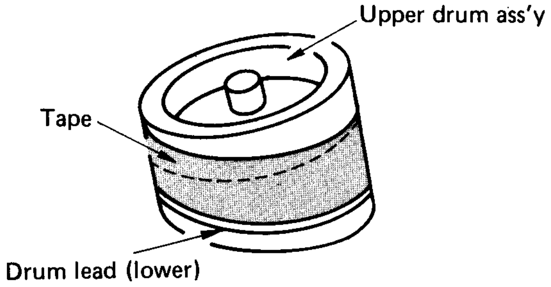


Fig. 5-28 Drum lead check-1

NOTES:

1. Slips upward : sound becomes produced by contact between tips of rotating heads and edge of tape.
2. Slips downward: tape curls or wrinkles from contacting lead face (sound may also be produced).
3. During loading, Play and unloading, observe the tape at the supply and take-up guide rollers and guide poles.
   Confirm absence of curling, wrinkling, etc. as shown in Fig. 5-29.

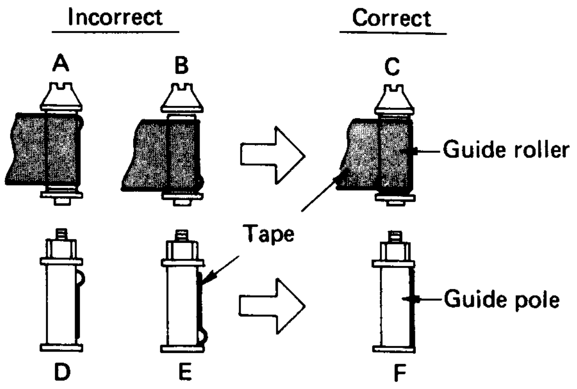

Incorrect
Correct
A
B
C
Guide roller
Tape
Guide pole
D
E
F

Fig. 5-29 Guide roller and Guide pole

4. Observe the tape as it becomes wrapped around drum during loading and as it separates from the drum during unloading.
   Confirm absence of damage to the tape at points C and D as shown in Fig. 5-30 and absence of contact noise between head tips and tape edge.

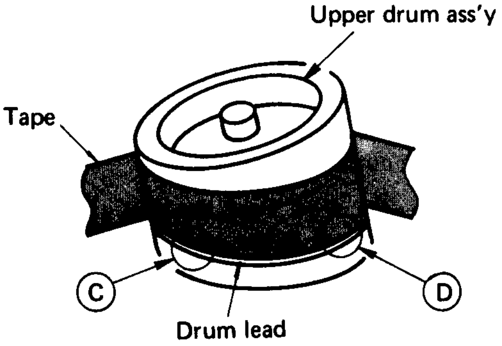

Upper drum ass'y
Tape
Ⓒ
Drum lead
Ⓓ

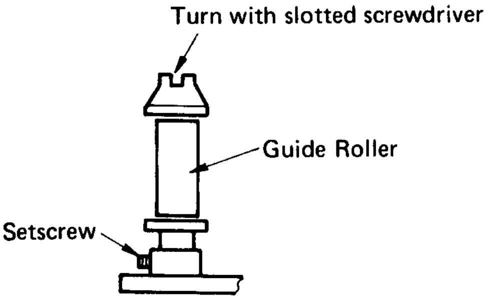
Fig. 5-30 Drum lead check-2

5-7-2. Tape transport adjustments

Perform only if defects are noted during tape transport check (5-7-1).

A: Guide roller height

1. Slightly loosen setscrews of the supply and take-up guide rollers as shown in Fig. 5-31.
2. Use cassette tape and set for Play mode.
3. With a slotted screwdriver, slightly turn the supply guide roller (do not turn more than 180° at a time) and adjust so that at the drum input, the tape travels smoothly in the drum lead without slipping upwards or downwards.
4. Similarly, adjust the take-up guide roller for the drum output.


Turn with slotted screwdriver
Guide Roller
Setscrew

Fi. 5-31 Guide roller height

NOTES:

1. Loosen the setscrews only enough to allow the guide rollers to be turned.
   If excessively loose, tape motion may turn the rollers inadvertently.
2. Turn the rollers carefully to avoid damage to the tape.

B: Supply guide pole height

1. Use cassette tape and set for Play mode.
2. Use a nutdriver to turn the supply guide pole to align the upper flange of the guide pole with the upper edge of the tape as shown by F of Fig. 5-29.
   However, this adjustment must be performed so that at the same time, the upper flange remains within ±0.5 mm of the height adjusting jig portion shown in Fig. 5-21.
   If there is a large discrepancy, check the height of the supply reel disk, tension pole and other mechanical components.

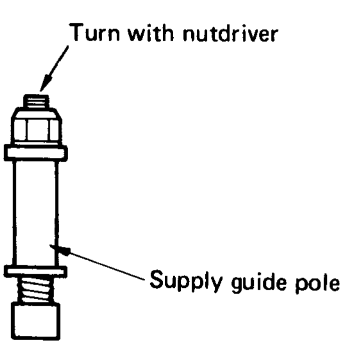

Turn with nutdriver
Supply guide pole

Fig. 5-32 Supply guide pole height

C: Take up guide pole

NOTE: Do not adjust the height of the take-up guide pole itself.

1. Employ cassette tape and set for Play mode.
2. Turn audio/control head screw Ⓒ as shown in Fig. 5-33 and adjust for smooth transport at the take-up guide pole as shown by F of Fig. 5-29.

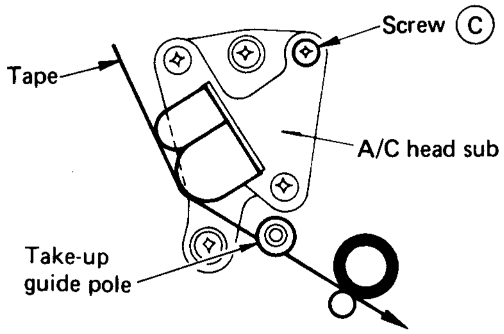


Fig. 5-33 Take-up guide pole

5-8. INTERCHANGEABILITY ADJUSTMENT

Before using alignment tape, employ cassette tape and confirm correct tape transport.

5-8-1. Preliminary checks

A: Check sequence 1

1. Connect oscilloscope to PRE/REC TP-5 (FM OUT). At this time, trigger the oscilloscope externally with the signal (30 Hz square wave) from SERVO TP-2 (F.F.) and set oscilloscope sync slope to minus (−).

NOTE: The track widths of both heads are wider than those of standard models, while the CH-2 track width is wider than CH-1. Therefore when checking FM output, observe the CH-1 FM output only.

2. Play stairstep portion of the alignment tape.
3. Turn the Normal tracking control and adjust for maximum FM output at PRE/REC TP-5. Set the Normal Tracking control to AUTO (center click position) and confirm that nearly maximum output is obtained.
4. Refer to Fig. 5-34. Read the level of portion (a) of the waveform. If the waveform is serrated at point (a), read the value at the most uniform serrations as shown at left in Fig. 5-34.
5. As shown by the broken lines, read the FM waveform value at point (b) and confirm that:

$$\frac{b}{a} \geqq 0.7 \text{ or } 20 \log \frac{b}{a} \geqq -3 \text{ dB}$$

6. Read the values at points (c) and (d) [from input and output] and confirm that:

$$\frac{c}{a} \geqq 0.5 \text{ and } \frac{b}{a} \geqq 0.5 \; (\geqq -6 \text{ dB})$$

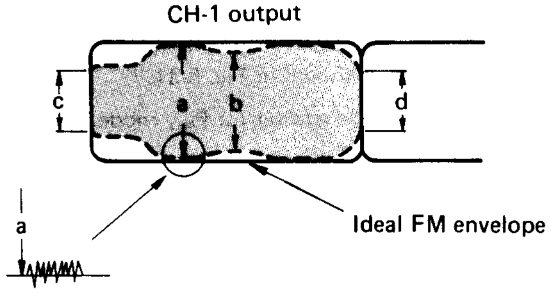


Fig. 5-34 CH-1 FM waveform (max. output)

NOTES:

1. Read minimum levels for (b), (c) and (d).
2. If above checks yield normal results, proceed to section 5-8-1 B.)
3. If defects are noted, perform adjustments of section 5-8-2.

B: Check sequence 2

1. Observe the FM waveform as in the previous section (5-8-1 A) and turn the Normal Tracking control. The waveform variation should be nearly parallel as shown in Fig. 5-36.
2. If the waveform varies as shown in Fig. 5-35, adjustment becomes required.

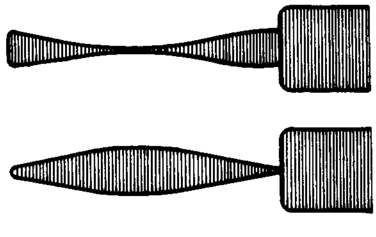


Fig. 5-35 Incorrect waveform examples

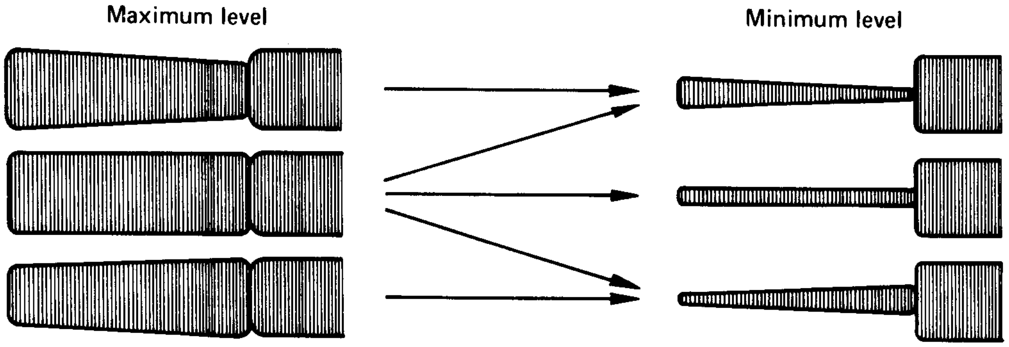


Fig. 5-36 Normal waveform examples

5-8-2. Preliminary adjustments

1. Loosen the setscrews of the supply guide roller and take-up guide roller.
   If the guide rollers turn freely, slightly tighten the setscrews.
2. Without the cassette housing ass'y, open cassette cover and insert cassette.
   At this time, place a weight on the cassette to hold the cassette in place.
3. Connect oscilloscope to PRE/REC TP-5 (FM OUT).
   Trigger the oscilloscope externally with the signal from SERVO TP-2 (F.F.) and set oscilloscope sync slope to minus (–).
4. Play alignment tape (stairstep signal).

A: Drum input

1. Observe oscilloscope display and adjust the Normal Tracking control for maximum FM output.
2. Refer to Fig. 5-37. Examples of incorrect waveforms are shown by A.
   Use a slotted screwdriver to adjust the supply guide roller so that the rising portion (drum input portion) of the waveform becomes flat as shown by B.

NOTES:

1. If the guide roller turns freely, tighten the setscrew slightly.
2. Be sure to adjust the guide roller only by small amounts at a time in order to avoid damaging the alignment tape.
   In addition to observing the waveform, confirm absence of tape slippage or curling at the drum lead and guide poles.
3. At the supply guide pole, if the tape separates from the guide or wrinking occurs, adjust the guide pole height.
   Align the upper flange of the guide pole with the tape as shown in Fig. 5-37.

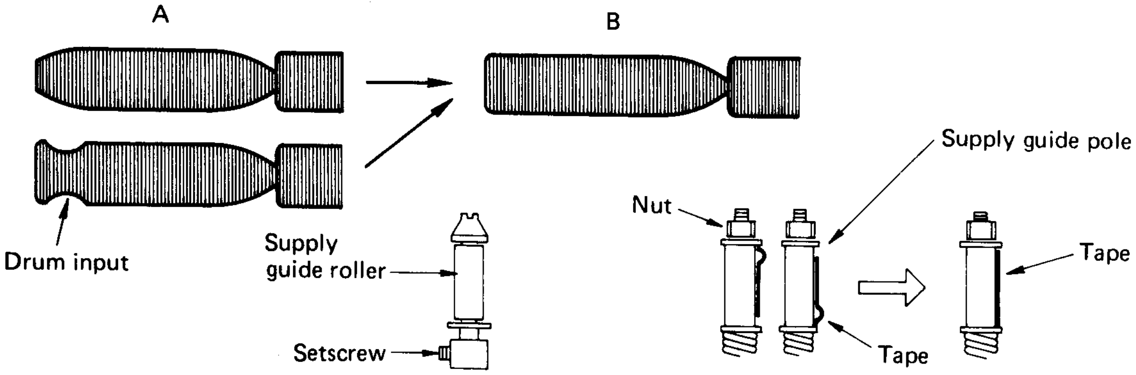


Fig. 5-37 Drum input adjustments

B: Drum output

1. In the same manner as for the drum input, turn the take-up guide roller to adjust the falling portion (drum output portion) of the FM waveform.
   Incorrect examples are shown by C in Fig. 5-39, while D indicates the correct adjustment.

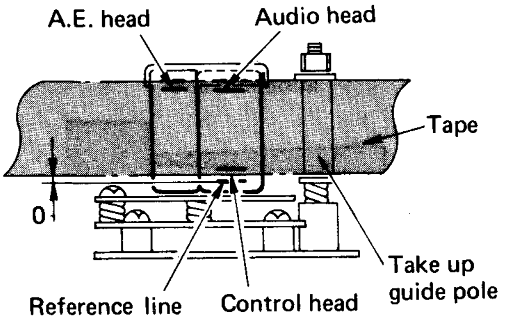


Fig. 5-38 Audio/control head height

2. If the tape separates from the guide or wrinkling occurs at the take-up guide pole, adjust by turning screw Ⓒ of the audio/control head as shown in Fig. 5-39.
3. Carefully and evenly adjust screws Ⓐ, Ⓑ and Ⓒ to align the audio/control head height with the tape as shown in Fig. 5-38.

NOTES:

1. Fine adjustment is not required at this time. It is sufficient that the tape is engaged with the guide pole and servo operates stably (control signal picked up).
2. If the tape separates from the take-up guide pole or wrinkling occurs, screw Ⓒ (Fig. 5-39) has been turned excessively with respect to screws Ⓐ and Ⓑ, causing the audio/control head to incline forward or rearward. Use care to adjust screws Ⓐ, Ⓑ and Ⓒ evenly and observe that small wrinkles are not produced at the take up guide pole.
3. Do not disturb the take-up guide pole.

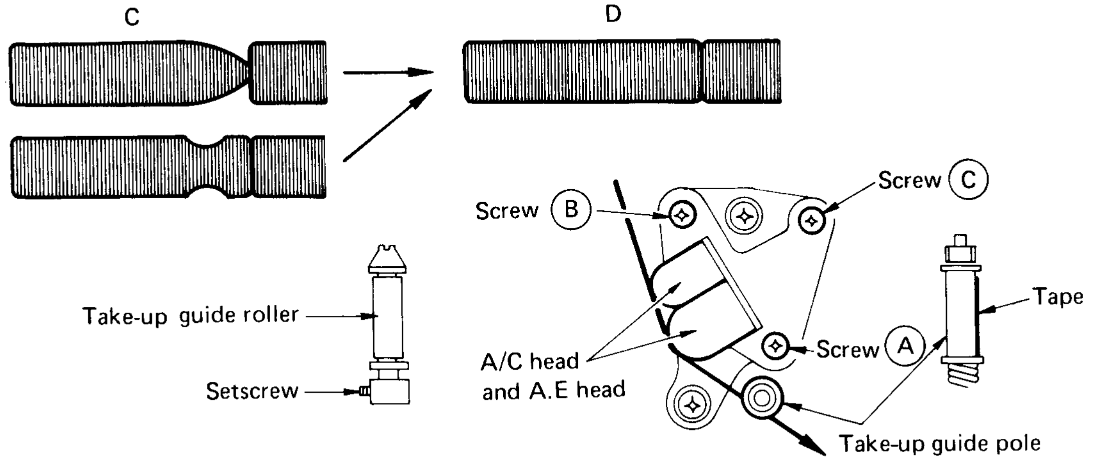


Fig. 5-39 Drum output adjustment

5-8-3. Interchangeability fine adjustment

1. Connect oscilloscope to PRE/REC TP-5 (FM OUT).
   Observe the CH-1 FM waveform and adjust the Normal Tracking control for minimum FM output level.
2. If the waveform becomes as shown by A or B of Fig. 5-40, carefully adjust the supply guide roller height so that the waveform becomes as shown by E, F or G of Fig. 5-41.
   At this time, if the waveform fluctuates, adjust to the point of minimum fluctuation.
3. If the FM waveform appears as shown by C and D in Fig. 5-40, carefully adjust the take-up guide roller height to obtain a waveform such as shown by E, F or G of Fig. 5-41.

At this time, if the waveform fluctuates, adjust to the point minimum fluctuation.

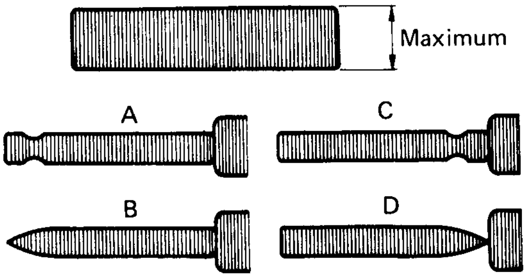


Fig. 5-40 Minimum FM output (incorrect examples)

4. Vary the Normal Tracking control from maximum to minimum FM output.
   Perform fine adjustment of supply and take-up guide rollers so that waveform variation becomes as shown by E,F and G of Fig. 5-41.

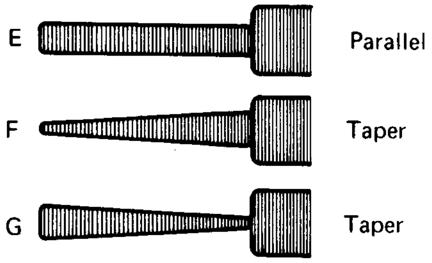


Fig. 5-41 Minimum FM output (correct examples)

5-8-4. Audio/control head height, azimuth and inclination

See section 5-5-3. Audio/control head.

5-8-5. Setscrew tightening

1. Check for maximum FM output waveform (Fig. 5-40), maximum audio out (Fig. 5-7) and absence of tape wrinkling or other transport irregularities, then secure the guide rollers.
   Perform in stop mode.
2. Since the guide rollers are easily moved, use care when securing.
3. After tightening the setscrews, again perform interchangeability final checks.

5-8-6. Interchangeability final checks

Confirm section 5-8-1. Preliminary checks.

5-8-7. Servo circuit adjustment

1. Playback switching point (see section 6-4, step 12)
2. Recording switching point (see section 6-4, step 13)
3. Tracking preset (see section 6-4, step 16)
4. Control head phase (see section 6-4, step 27)

5-8-8. Final checks (recording and playback)

1. Use cassette tape and perform recording and playback.
   Confirm FM waveform and specifications equivalent to those during plyback of alignment tape (stairstep signal).
   See section 5-8-1.
2. Perform checks and adjustments of the audio recording and playback levels and the audio circuit.
3. Check other signal systems by referring to section 6, electrical adjustment.

SECTION 6A

ELECTRICAL ADJUSTMENTS (VP-77EG/EK)

TABLE OF CONTENTS

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6-1. PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

6-1-1. Required test equipment

1. Digital voltmeter : Takeda Riken Model TR-6354B or equivalent
2. Oscilloscope : Wide-band, Dual-trace Matsushita VP-5503A or equivalent
3. Signal generator : Color bar, Stairstep
4. Frequency counter : Matsushita Model VP-4545A or equivalent
5. Regulated DC power supply
6. Audio generator
7. Alignment tape : AKAI TF505MH

NOTE: Be sure to first check for smooth and proper tape transport before using the alignment tape.

6-1-2. AKAI alignment tape contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairstep	6 kHz	● Interchangeability checks and adjustments ● Servo circuit checks and adjustments ● Audio head azimuth adjustments Note: Set the TRACKING control to the center (click) position.
2	5 minutes	(none)	3 kHz	● Tape speed checks ● Wow and flutter checks
3	10 minutes	Color bar	1 kHz	● Video signal playback circuit checks and adjustments ● Audio signal playback circuit checks and adjustments Note: Set the TRACKING control to MANUAL and adjust for maximum FM output level at TP-5 (PB FM OUT) of the PRE/REC board.
4	3 minutes	RF sweep	(none)	● Video head resonance adjustments Marker: 5.0 MHz

Table 6-1 TF-505MH contents

6-1-3. Check and Adjustment steps

The check and adjustment steps are provided in the following in the form of charts. For clarity, the nomenclature used in the charts is outlined below.

No.	Checks and adjustments are numbered in the recommended sequence in which they are to be performed.
Item	Name assigned to the particular check and adjustment step.
Check Point	Location to which measuring instrument (oscilloscope unless otherwise noted) is to be connected.
Adjustment Parts	Variable component (resistor, capacitor, etc.) to be adjusted in this step. Dash (–) indicates check only.
Signal	Input signal required to perform adjustment. Dash (–) indicates that special signal is not required.
Color bar	Color bar signal as video input.
Stairstep	Stairstep signal as video input.
1 kHz	Supply a 1 kHz sinewave as audio input signal.

TF-505MH Color bar	Play color bar segment of AKAI TF-505MH alignment tape.
TF-505MH Stairstep	Play stairstep segment of AKAI TF-505MH alignment tape.
TF-505MH 3 kHz	Play 3 kHz audio signal segment of AKAI TF-505MH alignment tape.
TF-505MH 1 kHz	Play 1 kHz audio signal segment of AKAI TF-505MH alignment tape.
TF-505MH RF sweep	Play RF sweep segment of AKAI TF-505MH alignment tape.
Mode	Equipment operating mode at time of check or adjustment.
STOP	Power on and machine in Stop mode.
REC	Recording mode.
P.B.	Play mode.
REC → (another mode)	Use blank tape, record, then play back in the mode specified.
SLOW	Slow motion playback.
STILL	Still mode playback.
QUICK FINDER	Quick Finder (Q-CUE and Q-REVIEW) playback mode.
AUDIO DUB	Audio dubbing mode.
Description and Waveform	This column provides an explanation of the step, notes, adjustment values and waveform diagrams.

6-2. REGULATOR CIRCUIT AND PRELIMINARY CHECK

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description & Waveform
1	9V REG.	TP-15 Chroma	–	–	STOP	Vary DC power supply voltage for a range of from 11V to 15V at TP-14 of Chroma board. Confirm TP-15 voltage of 9 ± 0.2V DC.
2	Battery Power Indicator	TP-14 Chroma IC5-1 Mechacon Battery Power Indicator	R45 (B-ST) Mechacon R48 (B-AL) Mechacon	–	STOP	1. Adjust DC power supply for 10.5V at TP-14. 2. Rotate R45 fully counterclockwise, then turn it clockwise gradually until DC voltage at pin 1 of IC5 on Mechacon board becomes high. 3. Adjust the DC power supply for 11.0V at TP-14. 4. Rotate R48 fully clockwise, then turn it counterclockwise gradually until the battery power warning indicator lights.
3	Dew Indicator	Dew Indicator	R56 Mechacon	–	STOP	When a 10 kΩ resistor is temporarily added in parallel with R56, Dew indicator should light.

6-3. MECHANISM CONTROL CIRCUIT

6-3-1. Power on state

1. STOP LED lights.
2. The Stop mode is produced.
3. If tape is loaded, unloading is performed, then the Stop mode produced.

6-3-2. Mode priorities

1. Button operations are shown in the Mode shift table (Table 6-2). Generally, a desired mode can be selected directly from a mode in progress.
2. If two or more buttons are pressed simultaneously, the following priority applies: STOP – REC – DUB – PLAY – FF – REW – PAUSE/STILL.
3. Quick finder forward and reverse are enabled only during the Play, Still and Slow modes. These are performed while the Q-CUE or Q-REVIEW button is held depressed.
4. Simultaneously pressing the Q-CUE and Q-REVIEW buttons yields the Play mode.
5. The following combined button operations are enabled: REC + PLAY; REC + PAUSE/STILL; AUDIO DUB + PLAY; AUDIO DUB + PAUSE/STILL.

6-3-3. Stop mode entry

1. The Stop mode is entered automatically at tape end and tape start.
2. When the power supply voltage declines to 10.8V, the BATT indicator lights. At 10.5V, the Stop mode is automatically entered.
3. In event of moisture condensation, the DEW indicator lights and the Stop mode is entered. In this and the above cases, button operations are inhibited until normal conditions return.
4. During the COUNTER MEMORY mode, when the indication reaches 0 in FF and REW.
5. In the FF or REW mode, when the take-up reel stops for more than 4 to 6 seconds, the Stop mode is obtained (due to stop output from counter).

6-3-4. Alarm mode

In the following situations, the Stop mode is automatically set and the mode indicators flash sequentially from left to right. After correcting the difficulty, briefly set the power to off, then to on in order to enable mode operations.

1. If the brake and pinch switches are not operated on/off within approx. 2.5 seconds after the brake (main) and pinch solenoid commands are sent from the CPU.
2. Drum rotation stopped; absence of the drum flip-flop signal for 4 to 6 seconds in a mode when the head drum is supposed to rotate.
3. Take-up reel stops for 2 to 4 seconds in the Play, Recording or Audio Dub mode.
4. Cassette lamp failure.
5. Loading or unloading mode does not complete within about 6 seconds after starting.

Button operation / Current mode	STOP	PLAY	F.F.	REW	PLAY +REC	PLAY +DUB	P/S +REC	P/S +DUB	FWD	REV	PAUSE /STILL	SLOW	FRAME ADV
STOP		○	○	○	○	○	○	○	X	X	X	X	X
PLAY	○		○	○	○	○	○	○	○	○	○ STILL	○	X
F.F.	○	○		○	○	○	○	○	X	X	X	X	X
REW	○	○	○		○	○	○	○	X	X	X	X	X
REC	○	X	X	X		X	○	X	X	X	○ REC PAUSE	X	X
DUB	○	X	X	X	○		○	○	X	X	○ DUB PAUSE	X	X
REC PAUSE	○	○ REC	X	X	○	X		○	X	X		X	X
DUB PAUSE	○	○ DUB	X	X	○	○	○		X	X		X	X
FWD	○	○	○	○	○	○	○	○		X	○ STILL latch	○ SLOW latch	X
REV	○	○	○	○	○	○	○	○	○		○ STILL latch	○ SLOW latch	X
STILL	○	○	○	○	○	○	○	○	○	○		○	○
SLOW	○	○	○	○	○	○	○	○	○	○	○		X

○ : Enabled   X : Inhibited (Current mode maintained)

Table 6-2 Mode shift table

6-3-5. Recording (REC) lock switch

1. After power on, if the REC lock switch is pressed within about 2 seconds, the Recording mode is obtained.
2. If another operating button is pressed during this 2 seconds, REC lock is disregarded and the selected mode becomes entered.
3. REC lock operation is enabled in both loading and unloading modes.
4. REC lock is inhibited at tape end.
5. In REC LOCK recording, the REC PAUSE mode is held for about 3 seconds after completion of loading (although REC and PLAY indicators light) in order to obtain stable servo operation. Afterwards, the Recording mode is entered.
6. In the same manner as for normal Recording mode, other button operations are enabled during the REC LOCK mode.

6-3-6. Camera operations (Camera connected)

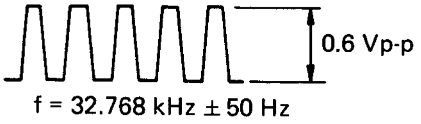
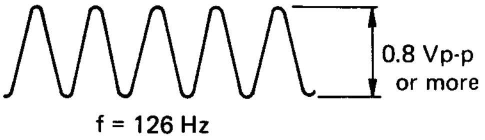
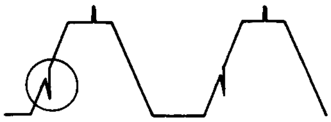
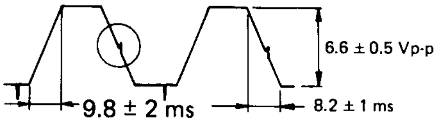
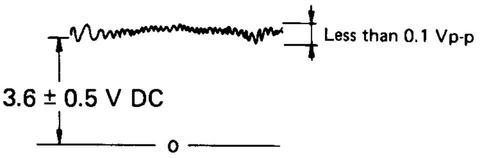
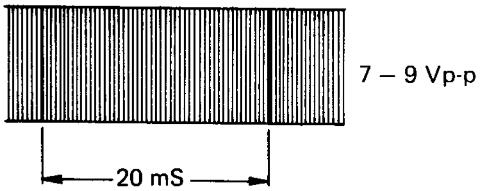
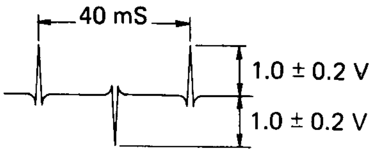
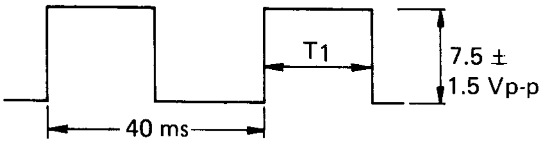
1. During camera stop, REC operation from the mainframe is inhibited. At other times, it is enabled.
2. In the camera start mode, REC PAUSE can be set from the mainframe. At this time, recording can be resumed from the camera by briefly setting to camera stop, then to camera start.

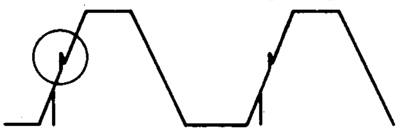
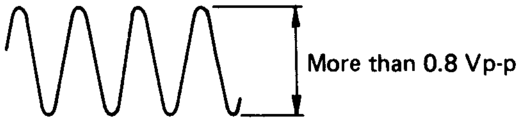
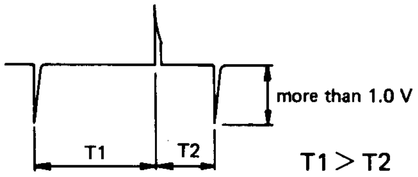
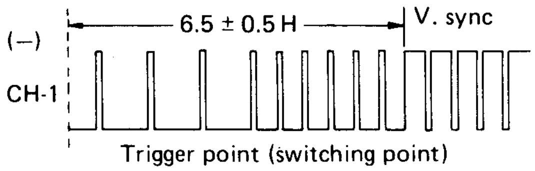
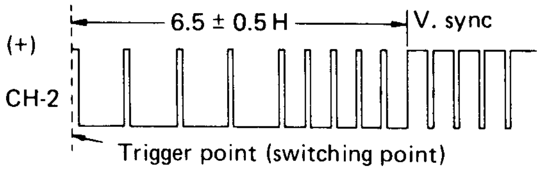
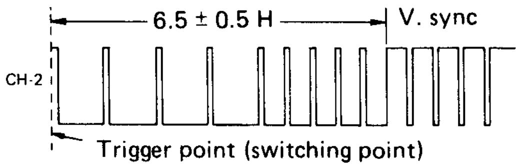
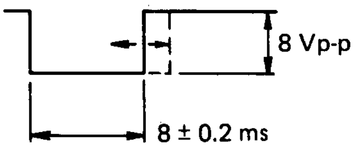
6-3-7. Other operations

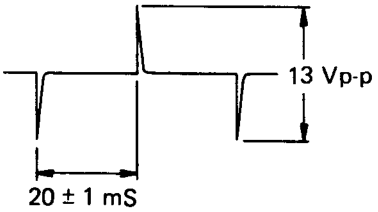
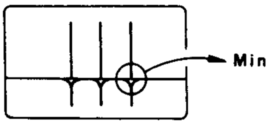
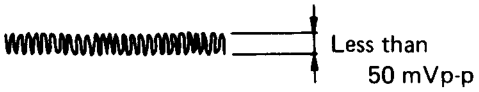
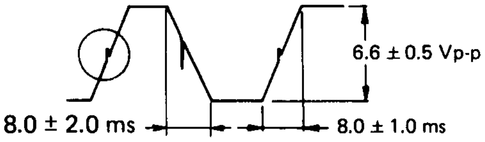
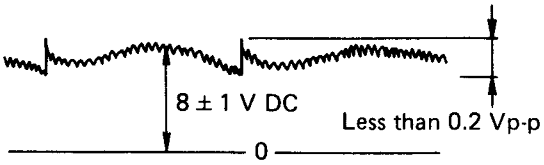
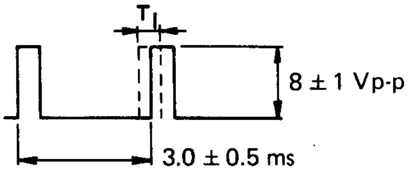
1. If Still, Slow, REC Pause or Dub Pause are set at the transparent leader portion of the tape, the Play/REC mode is initially performed, then the selected mode becomes entered.
2. Continuous duration of the Still, Slow, REC Pause and Dub Pause modes is limited to approximately 5 minutes, after which the Stop mode is automatically entered.
3. When Still or Slow is set during the loading process, the Play mode is performed for about one second after completion of loading, then the selected mode is entered.
4. At tape end, Play, REC, Dub and FF are inhibited.
5. At tape start, REW and Q-REVIEW are inhibited.
6. During the transition from Quick Finder to Slow or Still, the Play mode is performed for about one second, then the selected mode is entered.
7. When REC LOCK is set at the starting portion of the tape, after passage of the tape leader, the REC Pause mode is set for about 3 seconds, then the Recording mode is entered.
8. Both REC and Dub modes are inhibited in absence of the REC safety tab (REC safety switch open).
9. In absence of the REC safety tab, simultaneously pressing the REC + PLAY or AUDIO DUB + PLAY buttons yields the Play mode.
10. Pinch roller operation is synchronized to the drum flipflop pulse in the REC, REC Pause, Dub and Dub pause modes.
11. Frame advance is enabled only in the Still mode. One TV picture frame is advanced every time the FR ADV button is pressed. When the button is held depressed, advance becomes continuous at the rate or one frame per second.

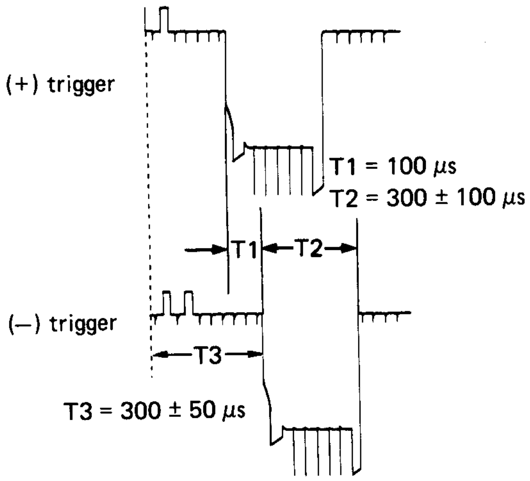
6-4. SERVO CIRCUIT

NOTE: Check points and adjustment parts are located on SERVO board except where indicated.

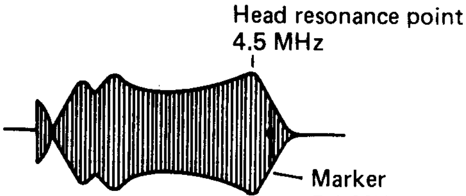
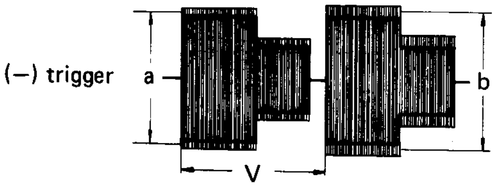
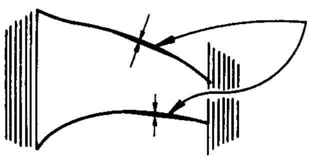
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	32 kHz Osc.	IC1 Pin 28	–	–	STOP	Connect frequency counter to pin 28 of IC1.  0.6 Vp-p f = 32.768 kHz ± 50 Hz
2	Capstan FG	TP-22	–	–	REC	 0.8 Vp-p or more f = 126 Hz Level fluctuation less than 2 dB.
3	Capstan Free-run	TP-5	R210 (C.F.R.)	–	REC	Short circuit TP-23 and TP-26. Adjust R210 for minimum sampling pulse drift. 
4	Capstan Sampling Pulse	TP-5	–	–	REC	The sampling pulse is positioned at about center of the ramp.  6.6 ± 0.5 Vp-p 9.8 ± 2 ms 8.2 ± 1 ms
5	Capstan Motor Input	TP-24	–	–	REC	 Less than 0.1 Vp-p 3.6 ± 0.5 V DC 0
6	V. Sync Out	TP-1	–	Color Bar	STOP	
7	Drum Pulse	TP-10	R82 (D.PU)	Color Bar	REC	Confirm drum servo lock.  40 mS 1.0 ± 0.2 V 1.0 ± 0.2 V
8	Drum Flip-flop	TP-2	–	Color Bar	REC	Flip-flop (F.F.) output should appear even if the drum is slowed by hand so that T1 becomes 25 msec.  T1 7.5 ± 1.5 Vp-p 40 ms

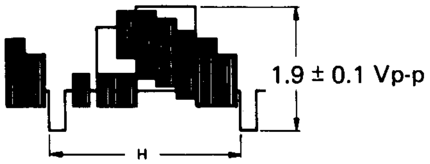
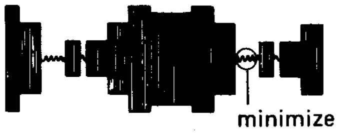
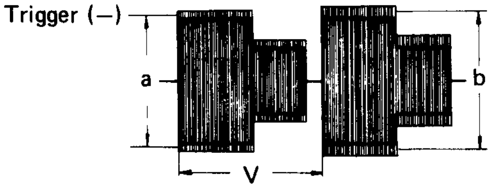
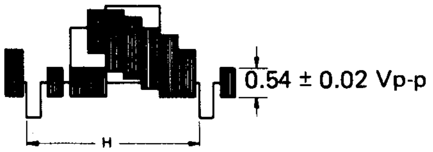
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
9	Drum Free-run	TP-4	R47 (D. F.R.)	Color Bar	REC	Short circuit TP-6 and TP-26. Adjust R47 for minimum sampling pulse drift. 
10	Drum F.G.	TP-7	–	Color Bar	REC	 More than 0.8 Vp-p f ≒ 1.5 kHz Level fluctuation less than 1 dB
11	P.B. Control Pulse	TP-11	–	TF-505MH Color Bar	P.B.	 more than 1.0 V T1 T2 T1 > T2
				Color Bar	REC ↓ P.B.	
12	P.B. Switching Point	TP-1	R16 (CH-1 SW Phase)	TF-505MH Stairstep	P.B.	Trigger oscilloscope externally from TP-2 and set trigger slope to "–".  6.5 ± 0.5 H V. sync (–) CH-1 Trigger point (switching point)
			R15 (CH-2 SW Phase)	TF-505MH Stairstep	P.B.	Set trigger slope to "+".  6.5 ± 0.5 H V. sync (+) CH-2 Trigger point (switching point) Confirm a difference between CH-1 and CH-2 of within 1H.
13	REC Switching Point	TP-1	R4 (REC SW)	Color Bar	REC	Trigger oscilloscope externally from TP-2 and set trigger slope to "+"  6.5 ± 0.5 H V. sync CH-2 Trigger point (switching point)
14	REC CTL Delay	TP-14	R96 (CTL REC D)	Color Bar	REC	

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
15	P.B. CTL Delay	TP-13	R98 (CTL P.B. D)	Color Bar	REC ↓ P.B.	
16	Tracking Pre-set	TV Screen	R2 (Pre-set)	Stairstep (Color Bar)	REC ↓ P.B.	1. Set R1 (Tracking) to the center click position. 2. Observe the TV screen and adjust R2 (Pre-set) to minimize dihedral error. 
17	CTL Amp Noise	TP-11	–	–	STILL	
18	Drum Sampling Pulse	TP-4	–	Color Bar	REC ↓ P.B.	The sampling pulse is positioned at about center of the ramp. 
19	Drum Lock-in Time	TP-4	–	Color Bar	REC	In the transition from the Stop mode, with the drum completely stopped, to the REC mode, the sampling pulse shall stabilize within 10 seconds. If abnormal, check Step 9 again.
20	Drum Motor Input	TP-8	–	Color Bar	REC	
21	Tape Speed	TP-2/Audio (or Audio Out)	–	TF-505MH 3 kHz	P.B.	3000 ± 9 Hz. This is also true if TP-3, TP-6 and TP-26 are shorted. If abnormal, check Step 3 again.
22	Quick Finder Tape Speed	TP-12	–	Color Bar	REC ↓ QF	T1 is less than 0.5 msec. 
23	Quick Finder Drum Speed	TV Screen	R26 (CUE) R29 (REVIEW)	Color Bar	REC ↓ QF	Confirm that color bars appear properly on the TV screen.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
24	Slow Pulse	TV Screen	R196 (S. Pos.) R189 (Pre-set)	Color Bar	REC ↓ SLOW	1. Adjust the Slow speed for maximum and set R191 (Slow track) to the center click position. 2. Observe the TV screen and adjust R196 and R189 so that the bar noise is most nearly (or completely) eliminated from the picture. 3. Check that the noise bar moves when R191 is varied.
25	Drum Vibration	TV Screen	R203 (D. VIB.)	Color Bar	REC ↓ SLOW	1. Adjust the Slow speed for maximum. 2. Observe the TV screen and adjust R203 (D. VIB.) for minimum horizontal swing.
26	V. Pulse	TP-27	R198 (CH-2 V.P.) R33 (CH-1 V.P.)	Color Bar	REC ↓ STILL	1. Set R198 to the center of variable range. 2. Trigger the oscilloscope externally from TP-2. 3. Adjust R33 to obtain T1 of 100 μsec.  (+) trigger T1 = 100 µs T2 = 300 ± 100 µs T1 T2 (–) trigger T3 T3 = 300 ± 50 µs Note: If customer's TV set is available, observe display on screen and adjust R198 (hole in bottom cover) to minimize vertical jitter.
					STILL SLOW QF	Confirm that the V. pulse is present during the Still, Slow and Quick Finder modes.
27	CTL Head	TP-5 Pre/Rec TV Screen	–	TF-505MH Stairstep	P.B.	Perform after completing No. 24. 1. Set R191 (Slow track) to the center click position. 2. Adjust the CTL head position to obtain maximum FM waveform at TP-5 on PRE/REC board. 3. If noise bar appears on the TV screen in Slow mode, carefully adjust the head position to remove the noise bar from the picture.

6-5. VIDEO SYSTEM

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	Video Head Resonance and Q.	TP-5 Pre/Rec	R35 (CH-1 Q) R36 (CH-2 Q) C17 (CH-1 f_0) C18 (CH-2 f_0) Pre/Rec.	TF-505MH RF Sweep	P.B.	NOTE: This adjustment is required only after replacing the upper drum (video heads). 1. Trigger the oscilloscope externally from TP-2 on Servo board. 2. Turn R35 fully counterclockwise and R36 fully clockwise. 3. Adjust C17 to set the CH-1 resonance point to 4.5 MHz and C18 to set the CH-2 resonance point to 4.5 MHz. Notes: 1. The TF-505MH marker appears at 5.0 MHz. However, adjust for 4.5 MHz. 2. Use (–) trigger for CH-1 and (+) for CH-2.  4. Adjust R35 so that the CH-1 waveform becomes similar to the CH-2 waveform. 5. Record a video signal, then play back. Confirm absence of flicker and black-white reversal in the reproduced picture. If necessary, carefully readjust R35 and R36.
2	P.B. Color Level	TP-2 Chroma	R51 (P.B. Color) Pre/Rec	TF-505MH Color Bar	P.B.	1. Adjust R1 (tracking) to obtain maximum FM waveform of TP-5 on Pre/Rec board. 2. Trigger the oscilloscope externally from TP-2 on Servo board.  $\frac{a+b}{2} = 0.1 \pm 0.02$ Vp-p Channel difference within 3 dB.
3	Limiter Balance	TP-7 Y	R73 (Limiter Bal.) Y	TF-505MH RF Sweep	P.B.	Adjust R73 to obtain a single line as shown in the figure. 

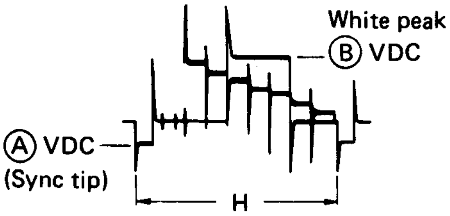
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
4	P.B. Video Level	TP-8 Y	R57 (P.B. Y. Level) Y	TF-505MH Color Bar	P.B.	
5	AFC	TP-6 Chroma	R46 (AFC) Chroma	Color Bar	REC	Connect an electrolytic capacitor (470 μ/16V) between TP-4 and ground. 15.625 kHz ± 50 Hz
6	VXO-1	TP-7 Chroma	R77 (VXO-1) Chroma	Color Bar	REC	4.435571 MHz ± 50 Hz
7	VXO-2	TP-9 Chroma	R111 (VXO-2) Chroma	Stairstep	REC	4.433619 MHz ± 100 Hz Change to a color bar input signal and confirm 4.433619 MHz ± 10 Hz.
8	P.B. 4.43 MHz	TP-2 Chroma	C46 (P.B. 4.43 MHz) Chroma	Color Bar	REC ↓ P.B.	4.433619 MHz ± 50 Hz
9	Converter Balance	TP-1 Chroma	R17 (Balance) Chroma	Color Bar	REC ↓ P.B.	Adjust R17 for minimum leakage of the 5.06 MHz component. 
10	Cross-talk Cancel	TV Screen	R33 (Cross-talk)	Color Bar	REC ↓ P.B.	1. Turn R1 (TRACKING) to where horizontal noise appears on the TV screen. 2. Adjust R13 to minimize the noise.
11	ACC Output Level	TP-1 Chroma	R89 (ACC Out Level)	Color Bar	REC ↓ P.B.	Trigger the oscilloscope externally from TP-2 of Servo board.  $\frac{a+b}{2}$ = 0.2 ± 0.02 Vp-p
12	Color Output Level	TP-8 Y	R24 (Color Level) Chroma	Color Bar	REC ↓ P.B.	

<table>
<tr><th>No.</th><th>Item</th><th>Check Point</th><th>Adjustment Parts</th><th>Signal</th><th>Mode</th><th>Description and Waveform</th></tr>
<tr><td>13</td><td>Carrier Deviation</td><td>TP-4
TP-12
Y</td><td>R13
(Carrier Bal.)
R12
(Carrier)
R38
(Deviation)
Y</td><td>Color Bar</td><td>STOP</td><td>

NOTES: 1. These adjustments are generally unnecessary except when replacing IC2 of the Y board.

2. Before adjustment, turn R17 (White clip) and R18 (Dark clip) fully clockwise. After adjustment, perform No. 11.

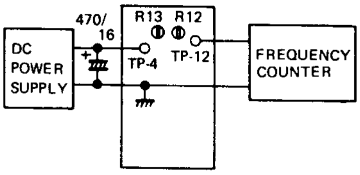
1. Connect an oscilloscope to TP-4 of Y board and precisely measure the DC potential of the sync tip. Make a note of this as voltage "A".



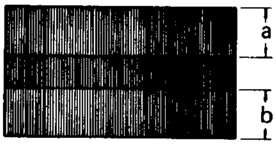
2. Connect a 470 μF/16V electrolytic capacitor between TP-4 and ground.

3. Set a DC power supply to precisely voltage "A" and apply this voltage between TP-4 and ground.

4. Connect an oscilloscope and a frequency counter to TP-12.



5. Adjust R13 so that the modulation waveform becomes symmetrical vertically.



a = b

6. Adjust R12 for 3.8 MHz at TP-12.

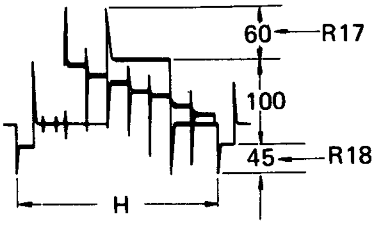
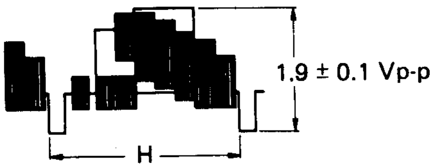
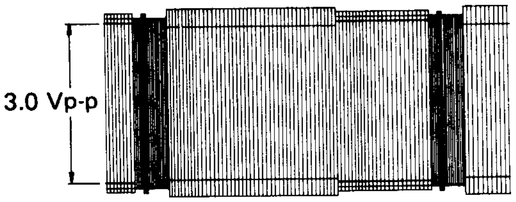
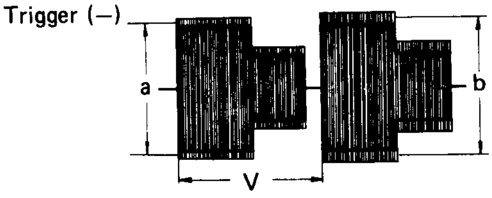
7. Carefully adjust the DC power supply to obtain 4.8 MHz at TP-12.

8. Connect an oscilloscope to TP-4 and precisely read the voltage of the DC power supply at this time. Make a note of it as voltage "B".

9. Disconnect the capacitor, DC power supply and frequency counter.

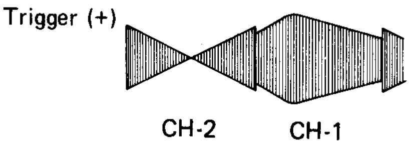
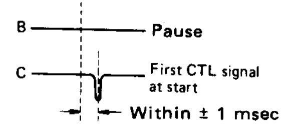
10. Adjust R38 so that the white peak at TP-4 becomes equal to voltage "B".

</td></tr>
</table>

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
14	White Clip Dark Clip	TP-3 Y	R17 (White Clip) R18 (Dark Clip) Y	Color Bar	STOP	Adjust R17 and R18 to obtain relations shown in the figure. 
15	E-E Level	TP-8 Y	R27 (E-E) Y	Color Bar	STOP	
16	REC FM Level	TP-1 Pre/Rec	R1 (REC FM) Pre/Rec	Color Bar	REC	
17	REC Color Level and Balance	TP-2 Chroma	R2 (Rec. Col.) R24 (Rec. Col. Bal.) Pre/Rec	Color Bar	REC ↓ P.B.	1. Trigger the oscilloscope externally from TP-2 of Servo board. 2. During recording, adjust R2 and R24 so that the CH-1 (a) and CH-2 (b) color output levels become the same as the levels of No. 2 during playback. 
18	SECAM Detector	TP-11 S. Det.	R95 (SECAM Det.) L10 S. Det.	SECAM Color Bar	REC ↓ P.B.	1. Set R95 to about the center of rotation. 2. Adjust L10 for maximum DC voltage at TP-11. 3. Then adjust R95 for 8 ± 0.2V at TP-11.

6-6. PAUSE TIMING

NOTE: Perform the following steps only after completing mechanical adjustments.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	Stop Timing	TP-5 Pre/Rec	R14 (Edit-2) Mechacon	Color Bar	REC ↓ AUDIO DUB	1. Trigger the oscilloscope externally from TP-2 of Servo board. 2. Adjust R14 so that when the PAUSE button is pressed during Audio Dub mode, the minimum component of the FM output (noise position) becomes located at the center of the CH-2 FM waveform. 
2	Start Timing	TP-11 Servo	R13 (Edit-1) Mechacon	Color Bar	REC ↓ AUDIO DUB	1. Trigger the oscilloscope externally from TP-2 of Servo board. 2. During Audio Dub mode, observe the CTL signal when the servo is fully locked. 3. When the PAUSE button is pressed, then PLAY button is pressed, so that the position of the first CTL signal becomes the same (within ±1 msec), adjust R13.  Trigger (+) A During audio dub B Pause C First CTL signal at start Within ± 1 msec

6-7. AUDIO

NOTE: Adjustment parts are located on the Audio & CPU board.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	E-E Level	Audio Out	R45 (E-E Level)	1 kHz –24 dB (0.14 Vp-p) Sine-wave	STOP	–10 dB (0.72 Vp-p)
2	AGC	Audio Out	–	1 kHz 0 dB (2.2 Vp-p) Sine-wave	STOP	–2 dB (1.8 Vp-p) or less
3	P.B. Level	Audio Out	R36 (P.B. Level)	TF-505MH 1 kHz (Color Bar)	P.B.	–6 dB (1.1 Vp-p)
4	Bias Level	TP-23 Audio & CPU	R81 (Bias)	No Signal	REC	60 Vp-p 70 ± 5 kHz
5	REC Level	Audio Out	R43 (REC Level)	1 kHz –24 dB (0.14 Vp-p) Sine-wave	REC ↓ P.B.	Adjust R43 during Record mode so that the output level is –10 ± 1 dB during playback.

SECTION 6B

ELECTRICAL ADJUSTMENTS (VP-77S)

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6-1. PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

6-1-1. Required test equipment

1. Digital voltmeter : Takeda Riken Model TR-6354B or equivalent
2. Oscilloscope : Wide-band, Dual-trace Matsushita VP-5503A or equivalent
3. Signal generator : Color bar, Stairstep
4. Frequency counter : Matsushita Model VP-4545A or equivalent
5. Regulated DC power supply
6. Audio generator
7. Alignment tape : AKAI TF-507MH

NOTE: Be sure to first check for smooth and proper tape transport before using the alignment tape.

6-1-2. AKAI alignment tape contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairstep	6 kHz	● Interchangeability checks and adjustments ● Servo circuit checks and adjustments ● Audio head azimuth adjustments Note: Set the TRACKING control to the center (click) position.
2	5 minutes	(none)	3 kHz	● Tape speed checks ● Wow and flutter checks
3	10 minutes	Color bar	1 kHz (0 dB)	● Video signal playback circuit checks and adjustments ● Audio signal playback circuit checks and adjustments Note: Set the TRACKING control to MANUAL and adjust for maximum FM output level at TP-5 (PB FM OUT) of the PRE/REC board.
4	3 minutes	RF sweep	(none)	● Video head resonance adjustments Marker: 5.0 MHz

Table 6-1 TF-507 MH contents

6-1-3. Check and Adjustment steps

The check and adjustment steps are provided in the following in the form of charts. For clarity, the nomenclature used in the charts is outlined below.

NO.	Checks and adjustments are numbered in the recommended sequence in which they are to be performed.
Item	Name assigned to the particular check and adjustment step.
Check Point	Location to which measuring instrument (oscilloscope unless otherwise noted) is to be connected.
Adjustment Parts	Variable component (resistor, capacitor, etc.) to be adjusted in this step. Dash (–) indicates check only.
Signal	Input signal required to perform adjustment. Dash (–) indicates that special signal is not required.
Color bar	Color bar signal as video input.
Stairstep	Stairstep signal as video input.
1 kHz	Supply a 1 kHz sinewave as audio input signal.

TF-507MH Color bar	Play color bar segment of AKAI TF-507MH alignment tape.
TF-507MH Stairstep	Play stairstep segment of AKAI TF-507MH alignment tape.
TF-507MH 3 kHz	Play 3 kHz audio signal segment of AKAI TF-507MH alignment tape.
TF-507MH 1 kHz	Play 1 kHz audio signal segment of AKAI TF-507MH alignment tape.
TF-507MH RF sweep	Play RF sweep segment of AKAI TF-507MH alignment tape.
Mode	Equipment operating mode at time of check or adjustment.
STOP	Power on and machine in Stop mode.
REC	Recording mode.
P.B.	Play mode. mode.
REC → (another mode)	Use blank tape, record, then play back in the mode specified.
SLOW	Slow motion playback.
STILL	Still mode playback.
QUICK FINDER	Quick Finder (Q-CUE and Q-REVIEW) playback mode.
AUDIO DUB	Audio dubbing mode.
Description and Waveform	This column provides an explanation of the step, notes, adjustment values and waveform diagrams.

6-2. REGULATOR CIRCUIT AND PRELIMINARY CHECK

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description & Waveform
1	9 V REG.	TP-21 Chroma	–	–	STOP	Vary DC power supply voltage for a range of from 11V to 15V at TP-25 of Chroma board. Confirm TP-21 voltage of 9 ± 0.2V DC.
2	Battery Power Indicator	TP-25 Chroma IC5-1 Mechacon Battery Power Indicator	R45 (B-ST) Mechacon R48 (B-AL) Mechacon	–	STOP	1. Adjust DC power supply for 10.5V at TP-25. 2. Rotate R45 fully counterclockwise, then turn it clockwise gradually until DC voltage at pin 1 of IC5 on Mechacon board becomes high. 3. Adjust the DC power supply for 11.0V at TP-25. 4. Rotate R48 fully clockwise, then turn it counterclockwise gradually until the battery power warning indicator lights.
3	Dew Indicator	Dew Indicator	R56 Mechacon	–	STOP	When a 10 kΩ resistor is temporarily added in parallel with R56, Dew indicator should light.

6-3. MECHANISM CONTROL CIRCUIT

6-3-1. Power on state

1. STOP LED lights.
2. The Stop mode is produced.
3. If tape is loaded, unloading is performed, then the Stop mode produced.

6-3-2. Mode priorities

1. Button operations are shown in the Mode shift table (Table 6-2). Generally, a desired mode can be selected directly from a mode in progress.
2. If two or more buttons are pressed simultaneously, the following priority applies: STOP – REC – DUB – PLAY – FF – REW – PAUSE/STILL.
3. Quick Finder forward and reverse are enabled only during the Play, Still and Slow modes. These are performed while the Q-CUE or Q-REVIEW button is held depressed.
4. Simultaneously pressing the Q-CUE and Q-REVIEW buttons yields the Play mode.
5. The following combined button operations are enabled: REC + PLAY; REC + PAUSE/STILL; AUDIO DUB + PLAY; AUDIO DUB + PAUSE/STILL.

6-3-3. Stop mode entry

1. The Stop mode is entered automatically at tape end and tape start.
2. When the power supply voltage declines to 10.8V, the BATT indicator lights. At 10.5V, the Stop mode is automatically entered.
3. In event of moisture condensation, the DEW indicator lights and the Stop mode is entered. In this and the above cases, button operations are inhibited until normal conditions return.
4. During the COUNTER MEMORY mode, when the indication reaches 0 in FF and REW.
5. In the FF or REW mode, when the take-up reel stops for more than 4 to 6 seconds, the Stop mode is obtained (due to stop output from counter).

6-3-4. Alarm mode

In the following situations, the Stop mode is automatically set and the mode indicators flash sequentially from left to right. After correcting the difficulty, briefly set the power to off, then to on in order to enable mode operations.

1. If the brake and pinch switches are not operated on/off within approx. 2.5 seconds after the brake (main) and pinch solenoid commands are sent from the CPU.
2. Drum rotation stopped; absence of the drum flip-flop signal for 4 to 6 seconds in a mode when the head drum is supposed to rotate.
3. Take-up reel stops for 2 to 4 seconds in the Play, Recording or Audio Dub mode.
4. Cassette lamp failure.
5. Loading or unloading mode does not complete within about 6 seconds after starting.

Button operation / Current mode	STOP	PLAY	F.F.	REW	PLAY +REC	PLAY +DUB	P/S +REC	P/S +DUB	FWD	REV	PAUSE /STILL	SLOW	FRAME ADV
STOP		○	○	○	○	○	○	○	X	X	X	X	X
PLAY	○		○	○	○	○	○	○	○	○	○ STILL	○	X
F.F.	○	○		○	○	○	○	○	X	X	X	X	X
REW	○	○	○		○	○	○	○	X	X	X	X	X
REC	○	X	X	X		X	○	X	X	X	○ REC PAUSE	X	X
DUB	○	X	X	X	○		○	○	X	X	○ DUB PAUSE	X	X
REC PAUSE	○	○ REC	X	X	○	X		○	X	X		X	X
DUB PAUSE	○	○ DUB	X	X	○	○	○		X	X		X	X
FWD	○	○	○	○	○	○	○	○		X	○ STILL latch	○ SLOW latch	X
REV	○	○	○	○	○	○	○	○	○		○ STILL latch	○ SLOW latch	X
STILL	○	○	○	○	○	○	○	○	○	○		○	○
SLOW	○	○	○	○	○	○	○	○	○	○	○		X

○ : Enabled   X : Inhibited (Current mode maintained)

Table 6-2 Mode shift table

6-3-5. Recording (REC) lock switch

1. After power on, if the REC lock switch is pressed within about 2 seconds, the Recording mode is obtained.
2. If another operating button is pressed during this 2 seconds, REC lock is disregarded and the selected mode becomes entered.
3. REC lock operation is enabled in both loading and unloading modes.
4. REC lock is inhibited at tape end.
5. In REC LOCK recording, the REC PAUSE mode is held for about 3 seconds after completion of loading (although REC and PLAY indicators light) in order to obtain stable servo operation. Afterwards, the Recording mode is entered.
6. In the same manner as for normal Recording mode, other button operations are enabled during the REC LOCK mode.

6-3-6. Camera operations (Camera connected)

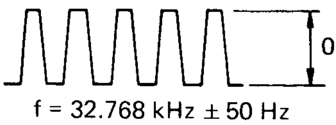
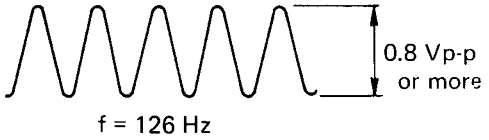
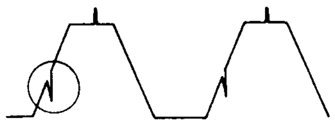
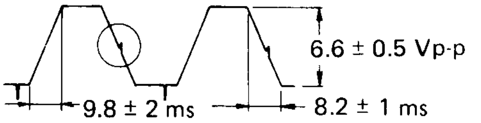
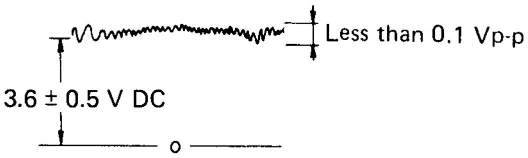
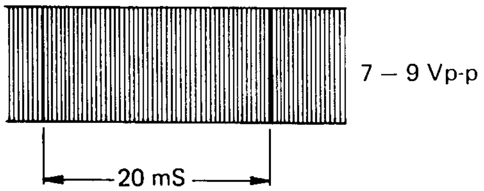
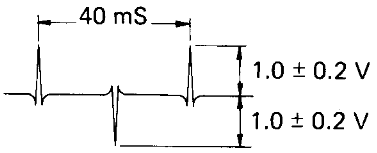
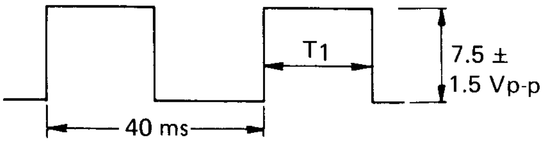
1. During camera stop, REC operation from the mainframe is inhibited. At other times, it is enabled.
2. In the camera start mode, REC PAUSE can be set from the mainframe. At this time, recording can be resumed from the camera by briefly setting to camera stop, then to camera start.

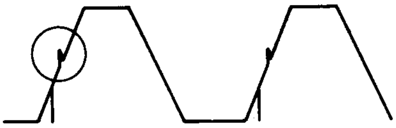
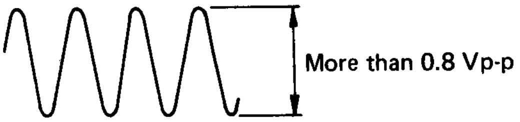
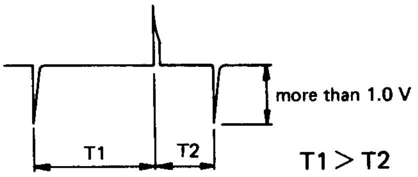
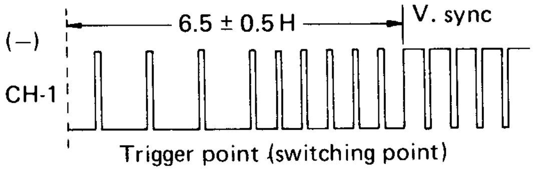
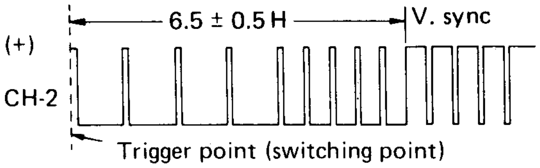
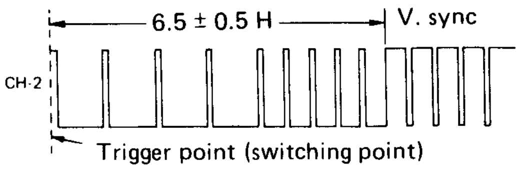
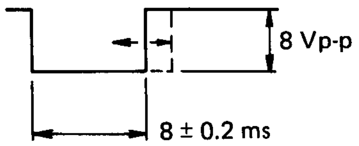
6-3-7. Other operations

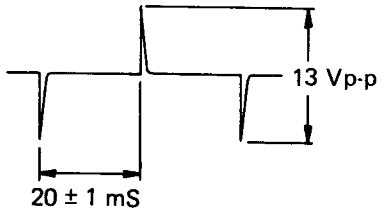
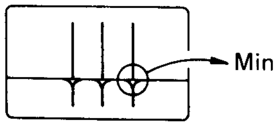
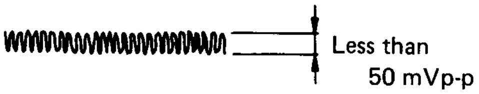
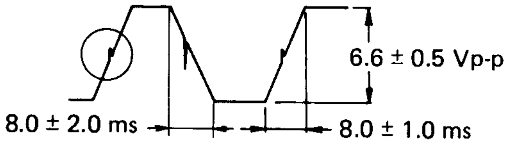
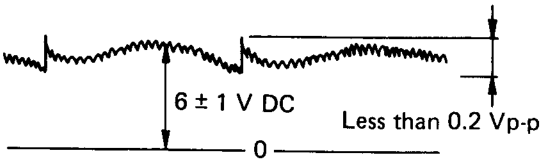
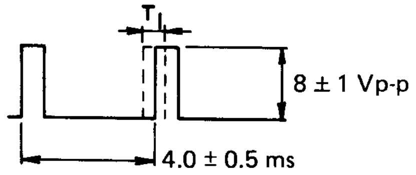
1. If Still, Slow, REC Pause or Dub Pause are set at the transparent leader portion of the tape, the Play/REC mode is initially performed, then the selected mode becomes entered.
2. Continuous duration of the Still, Slow, REC Pause and Dub Pause modes is limited to approximately 5 minutes, after which the Stop mode is automatically entered.
3. When Still or Slow is set during the loading process, the Play mode is performed for about one second after completion of loading, then the selected mode is entered.
4. At tape end, Play, REC, Dub and FF are inhibited.
5. At tape start, REW and Q-REVIEW are inhibited.
6. During the transition from Quick Finder to Slow or Still, the Play mode is performed for about one second, then the selected mode is entered.
7. When REC LOCK is set at the starting portion of the tape, after passage of the tape leader, the REC Pause mode is set for about 3 seconds, then the Recording mode is entered.
8. Both REC and Dub modes are inhibited in absence of the REC safety tab (REC safety switch open).
9. In absence of the REC safety tab, simultaneously pressing the REC + PLAY or AUDIO DUB + PLAY buttons yields the Play mode.
10. Pinch roller operation is synchronized to the drum flipflop pulse in the REC, REC Pause, Dub and Dub pause modes.
11. Frame advance is enabled only in the Still mode. One TV picture frame is advanced every time the FR ADV button is pressed. When the button is held depressed, advance becomes continuous at the rate or one frame per second.

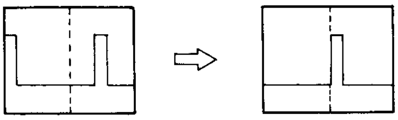
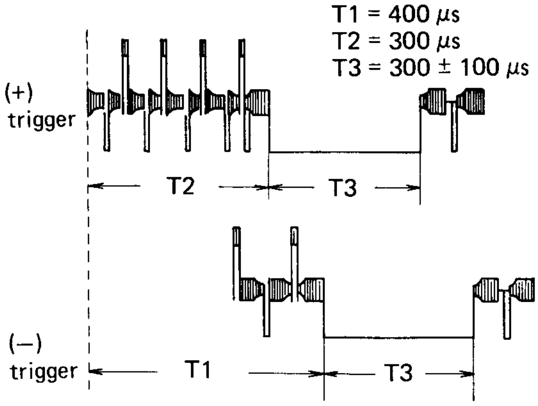
6-4. SERVO CIRCUIT

NOTE: Check points and adjustment parts are located on SERVO board except where indicated.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	32 kHz Osc.	IC1 Pin 28	–	–	STOP	Connect frequency counter to pin 28 of IC1.  0.6 Vp-p f = 32.768 kHz ± 50 Hz
2	Capstan FG	TP-22	–	–	REC	 0.8 Vp-p or more f = 126 Hz Level fluctuation less than 2 dB.
3	Capstan Free-run	TP-5	R210 (C.F.R.)	–	REC	Short circuit TP-23 and TP-26. Adjust R210 for minimum sampling pulse drift. 
4	Capstan Sampling Pulse	TP-5	–	–	REC	The sampling pulse is positioned at about center of the ramp.  6.6 ± 0.5 Vp-p 9.8 ± 2 ms 8.2 ± 1 ms
5	Capstan Motor Input	TP-24	–	–	REC	 Less than 0.1 Vp-p 3.6 ± 0.5 V DC o
6	V. Sync Out	TP-1	–	Color Bar	STOP	
7	Drum Pulse	TP-10	R82 (D.PU)	Color Bar	REC	Confirm drum servo lock.  40 mS 1.0 ± 0.2 V 1.0 ± 0.2 V
8	Drum Flip-flop	TP-2	–	Color Bar	REC	Flip-flop (F.F.) output should appear even if the drum is slowed by hand so that T1 becomes 25 msec.  T1 7.5 ± 1.5 Vp-p 40 ms

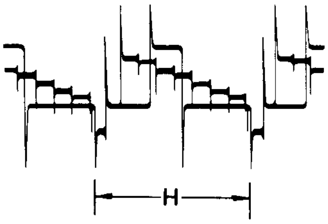
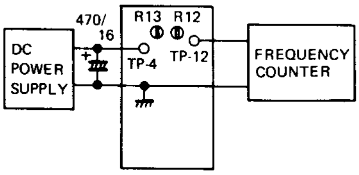
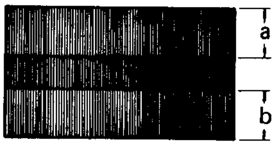
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
9	Drum Free-run	TP-4	R47 (D. F.R.)	Color Bar	REC	Short circuit TP-6 and TP-26. Adjust R47 for minimum sampling pulse drift. 
10	Drum F.G.	TP-7	–	Color Bar	REC	 More than 0.8 Vp-p f ≒ 1.5 kHz Level fluctuation less than 1 dB
11	P.B. Control Pulse	TP-11	–	TF-507MH Color Bar	P.B.	 more than 1.0 V T1 T2 T1 > T2
				Color Bar	REC ↓ P.B.	
12	P.B. Switching Point	TP-1	R16 (CH-1 SW Phase)	TF-507MH Stairstep	P.B.	Trigger oscilloscope externally from TP-2 and set trigger slope to "–".  6.5 ± 0.5 H V. sync (–) CH-1 Trigger point (switching point)
			R15 (CH-2 SW Phase)	TF-507MH Stairstep	P.B.	Set trigger slope to "+".  6.5 ± 0.5 H V. sync (+) CH-2 Trigger point (switching point) Confirm a difference between CH-1 and CH-2 of within 1H.
13	REC Switching Point	TP-1	R4 (REC SW)	Color Bar	REC	Trigger oscilloscope externally from TP-2 and set trigger slope to "+".  6.5 ± 0.5 H V. sync CH-2 Trigger point (switching point)
14	REC CTL Delay	TP-14	R96 (CTL REC D)	Color Bar	REC	

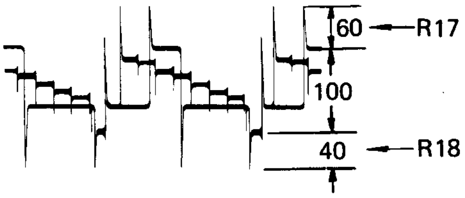
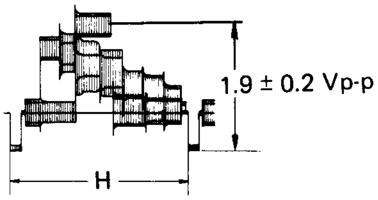
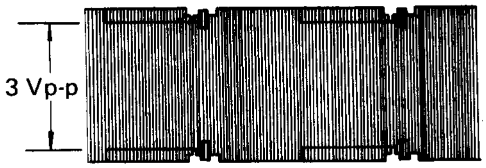
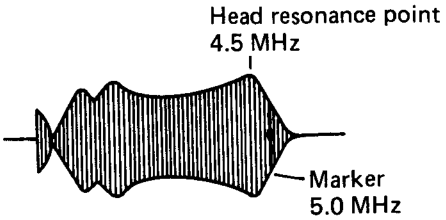
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
15	P.B. CTL Delay	TP-13	R98 (CTL P.B. D)	Color Bar	REC ↓ P.B.	
16	Tracking Pre-set	TV Screen	R2 (Pre-set)	Stairstep (Color Bar)	REC ↓ P.B.	1. Set R1 (Tracking) to the center click position. 2. Observe the TV screen and adjust R2 (Pre-set) to minimize dihedral error. 
17	CTL Amp Noise	TP-11	–	–	STILL	
18	Drum Sampling Pulse	TP-4	–	Color Bar	REC ↓ P.B.	The sampling pulse is positioned at about center of the ramp. 
19	Drum Lock-in Time	TP-4	–	Color Bar	REC	In the transition from the Stop mode, with the drum completely stopped, to the REC mode, the sampling pulse shall stabilize within 10 seconds. If abnormal, check Step 9 again.
20	Drum Motor Input	TP-8	–	Color Bar	REC	
21	Tape Speed	TP-2/Audio (or Audio Out)	–	TF-507MH 3 kHz	P.B.	3000 ± 9 Hz. This is also true if TP-3, TP-6 and TP-26 are shorted. If abnormal, check Step 3 again.
22	Quick Finder Tape Speed	TP-12	–	Color Bar	REC ↓ QF	T1 is less than 0.5 msec. 

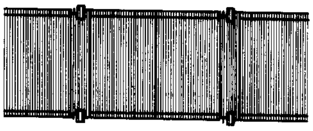
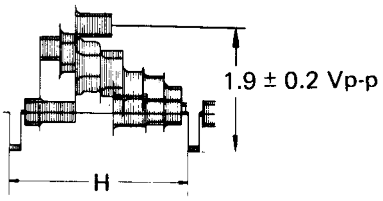
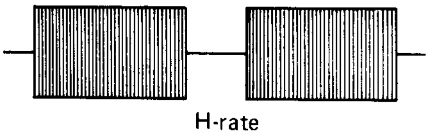
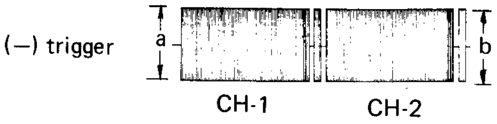
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
23	Quick Finder Drum Speed	TP-1	R26 (CUE) R29 (REVIEW)	TF-507MH Color Bar	P.B. QF	1. Set the time axis of the oscilloscope to 10 μsec/div. 2. Adjust the display to center the front porch of the H sync pulse (+ slope) in the Play mode. 3. Expand the oscilloscope display 5 times (press x5 button, etc.). 4. In the quick finder mode, in order to obtain the same position (within ±0.5 μs) of the H sync front porch as in above step 2. Quick Finder CUE .... Adjust R26 Quick Finder REVIEW......... Adjust R29 
24	Slow Pulse	TV Screen	R196 (S. Pos.) R189 (Pre-set)	Color Bar	REC ↓ SLOW	1. Adjust the Slow speed for maximum and set R191 (Slow track) to the center click position. 2. Observe the TV screen and adjust R196 and R189 so that the bar noise is most nearly (or completely) eliminated from the picture. 3. Check that the noise bar moves when R191 is varied.
25	Drum Vibration	TV Screen	R203 (D. VIB.)	Color Bar	REC ↓ SLOW	1. Adjust the Slow speed for maximum. 2. Observe the TV screen and adjust R203 (D. VIB.) for minimum horizontal swing.
26	V. Pulse	Video Out or TP-8 Y	R198 (CH-2 V.P.) R33 (CH-1 V.P.)	Color bar	REC ↓ STILL	1. Trigger the oscilloscope externally from TP-2. 2. Set trigger slope to "+", and adjust R198 to obtain T2 of 300 μs. 3. Set trigger slope to "–", and adjust R33 to obtain T1 of 400 μs.  T1 = 400 μs T2 = 300 μs T3 = 300 ± 100 μs (+) trigger T2 T3 (–) trigger T1 T3 Note: If customer's TV set is available, observe display on screen and adjust R198 (hole in bottom cover) to minimize vertical jitter.

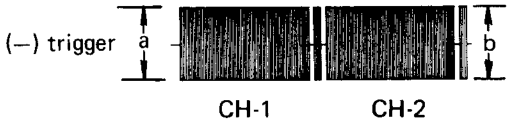
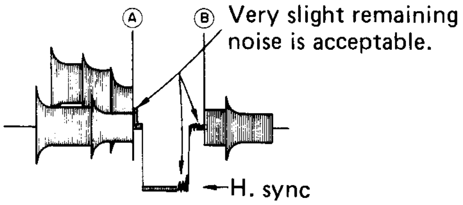
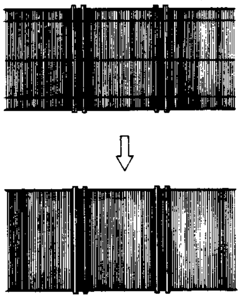
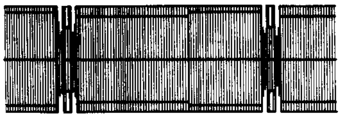
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
27	CTL Head	TP-5 Pre/Rec TV Screen	–	TF-507MH Stairstep	P.B.	Perform after completing No. 24. 1. Set R191 (Slow track) to the center click position. 2. Adjust the CTL head position to obtain maximum FM waveform at TP-5 on PRE/REC board. 3. If noise bar appears on the TV screen in Slow mode, carefully adjust the head position to remove the noise bar from the picture.

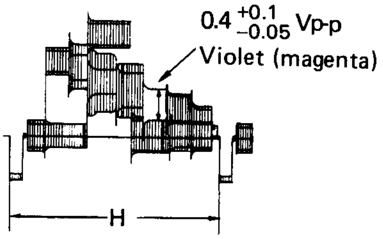
6-5. VIDEO SYSTEM

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	Carrier Deviation	TP-4 TP-12 Y	R13 (Carrier Bal.) R12 (Carrier) R38 (Deviation) Y	Color Bar	STOP	NOTES: 1. These adjustments are generally unnecessary except when replacing IC2 of the Y board. 2. Before adjustment, turn R17 (White clip) and R18 (Dark clip) fully clockwise. After adjustment, perform No. 2. 1. Connect an oscilloscope to TP-4 of Y board and precisely measure the DC potential of the sync tip. Make a note of this as voltage "A".  2. Connect a 470 μF/16V electrolytic capacitor between TP-4 and ground. 3. Set a DC power supply to precisely voltage "A" and apply this voltage between TP-4 and ground. 4. Connect an oscilloscope and a frequency counter to TP-12.  470/16 R13 R12 TP-4 TP-12 DC POWER SUPPLY FREQUENCY COUNTER 5. Adjust R13 so that the modulation waveform becomes symmetrical vertically.  a = b

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1						6. Adjust R12 for 3.8 MHz at TP-12. 7. Carefully adjust the DC power supply to obtain 4.8 MHz at TP-12. 8. Connect an oscilloscope to TP-4 and precisely read the voltage of the DC power supply at this time. Make a note of it as voltage "B". 9. Disconnect the capacitor, DC power supply and frequency counter. 10. Adjust R38 so that the white peak at TP-4 becomes equal to voltage "B".
2	White Clip Dark Clip	TP-3 Y	R17 (White Clip) R18 (Dark Clip) Y	Color Bar	STOP	Adjust R17 and R18 to obtain relations shown in the figure. 
3	E-E Level	TP-8 Y	R27 (E-E) Y	Color Bar	STOP	
4	REC FM Level	TP-1 Pre/Rec	R1 (REC FM) Pre/Rec	Color Bar	REC	
5	Video Head Resonance and Q	TP-5 Pre/Rec	R35 (CH-1 Q) R36 (CH-2 Q) C17 (CH-1 f_O) C18 (CH-2 f_O) Pre/Rec	TF-507MH RF Sweep	P.B.	NOTE: This adjustment is required only after replacing the upper drum (video heads). 1. Trigger the oscilloscope externally from TP-2 on Servo board. 2. Turn R35 fully counterclockwise and R36 fully clockwise. 3. Adjust C17 to set the CH-1 resonance point to 4.5 MHz and C18 to set the CH-2 resonance point to 4.5 MHz. Notes: 1. The TF-507MH marker appears at 5.0 MHz. However, adjust for 4.5 MHz. 2. Use (−) trigger for CH-1 and (+) for CH-2. 

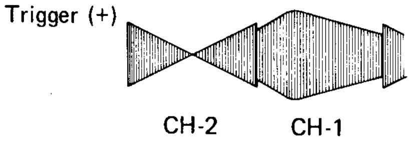
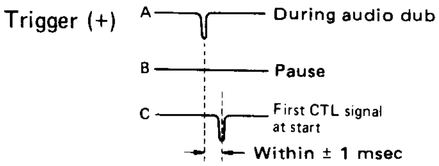
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
5						4. Adjust R35 so that the CH-1 waveform becomes similar to the CH-2 waveform. 5. Record a video signal, then play back. Confirm absence of flicker and black-white reversal in the reproduced picture. If necessary, carefully readjust R35 and R36.
6	Limiter Balance	TP-7 Y	R73 (Limiter Bal.) Y	Color Bar	REC ↓ P.B.	Adjust R73 to obtain a single line as shown in the figure. 
7	P.B. Video Level	TP-8 Y	R57 (P.B. Y. Level) Y	TF-507MH Color Bar	P.B.	
8	REC Limiter Balance	TP-3 Chroma	R42 (Limit. Bal.) Chroma	Color Bar	REC	Adjust R42 to center the level of the no signal component in the color signal H blanking period with respect to the color signal. 
9	Killer Point	TP-12 Chroma	R37 (Killer Point) Chroma	–	STOP	4.0 ± 0.1 V DC
10	REC Color Killer	TP-11 Chroma	R9 (Rec. Killer) Chroma	Color Bar	REC	11.2 V DC
				Stairstep	REC	Confirm level of less than 2V DC.
11	P.B. Color Level	TP-17 Chroma	R51 (P.B. Color) Pre/Rec	TF-507MH Color Bar	P.B.	1. Adjust R1 (tracking) on Servo board to obtain maximum FM waveform of TP-5 on Pre/Rec board. 2. Trigger the oscilloscope externally from TP-2 on Servo board.  3. Adjust R51 on Pre/Rec board to set the larger of the CH-1 and CH-2 outputs to 0.4 Vp-p. 4. At this time, confirm that the smaller of these outputs exceeds 0.28 Vp-p.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
12	REC Color Level and Balance	TP-17 Chroma	R2 (Rec. Col.) R24 (Rec. Col. Bal.) Pre/Rec	Color Bar	REC ↓ P.B.	1. Trigger the oscilloscope externally from TP-2 of Servo board. 2. During recording, adjust R2 and R24 so that the CH-1 (a) and CH-2 (b) color output levels become the same as the levels of No. 11 during playback. 
13	Noise Gate Pulse	TP-8 Y	R19 (Position) R21 (Width) Chroma	TF-507MH Color Bar	P.B.	1. Adjust R19 to obtain a noise gate position at point A.  Ⓐ Ⓑ Very slight remaining noise is acceptable. H. sync 2. Adjust R21 to vary the noise gate pulse width and obtain position B. 3. Perform the above adjustments so that residual noise is absent from H. sync and the color signal is not gated.
14	Limiter Balance and 2X Balance	TP-18 Chroma	R52 (Limit. Bal.) R48 (2X Bal.) Chroma	Color Bar	REC ↓ P.B.	Adjust R52 and R48 to minimize deviation in the overlapped portions. 
15	4X Balance	TP-19 Chroma	R63 (4X Bal.) Chroma		REC ↓ P.B.	Adjust R63 for maximum level. 
16	P.B. Color Killer	TP-11 Chroma	R32 (P.B. Killer)	Color Bar	REC ↓ P.B.	10.3 ± 0.3V DC

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
17	Color Output Level	TP-8 Y	R71 (P.B. Color) Chroma	Color Bar	REC ↓ P.B.	Adjust R71 to obtain violet (magenta) level of 0.4 Vp-p.  $0.4^{+0.1}_{-0.05}$ Vp-p Violet (magenta) H

6-6. PAUSE TIMING

NOTE: Perform the following steps only after completing mechanical adjustments.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	Stop Timing	TP-5 Pre/Rec	R14 (Edit-2) Mechacon	Color Bar	REC ↓ AUDIO DUB	1. Trigger the oscilloscope externally from TP-2 of Servo board. 2. Adjust R14 so that when the PAUSE button is pressed during Audio Dub mode, the minimum component of the FM output (noise position) becomes located at the center of the CH-2 FM waveform.  Trigger (+) CH-2 CH-1
2	Start Timing	TP-11 Servo	R13 (Edit-1) Mechacon	Color Bar	REC ↓ AUDIO DUB	1. Trigger the oscilloscope externally from TP-2 of Servo board. 2. During Audio Dub mode, observe the CTL signal when the servo is fully locked. 3. When the PAUSE button is pressed, then PLAY button is pressed, so that the position of the first CTL signal becomes the same (within ±1 msec), adjust R13.  Trigger (+) A During audio dub B Pause C First CTL signal at start Within ± 1 msec

6-7. AUDIO

NOTE: Adjustment parts are located on the Audio & CPU board.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	E-E Level	Audio Out	R45 (E-E Level)	1 kHz −24 dB (0.14 Vp-p) Sine-wave	STOP	−10 dB (0.7 Vp-p)
2	AGC	Audio Out	–	1 kHz 0 dB (2.2 Vp-p) Sine-wave	STOP	−2 dB (1.8 Vp-p) or less
3	P.B. Level	Audio Out	R36 (P.B. Level)	TF-507MH 1 kHz (Color Bar)	P.B.	−6 dB (1.1 Vp-p)
4	Bias Level	TP-23 Audio & CPU	R81 (Bias)	No Signal	REC	60 Vp-p 70 ± 5 kHz
5	REC Level	Audio Out	R43 (REC Level)	1 kHz −24 dB (0.14 Vp-p) Sine-wave	REC ↓ P.B.	Adjust R43 during Record mode so that the output level is −10 ± 1 dB during playback.

SECTION 7

EXPLODED VIEWS AND PARTS LIST

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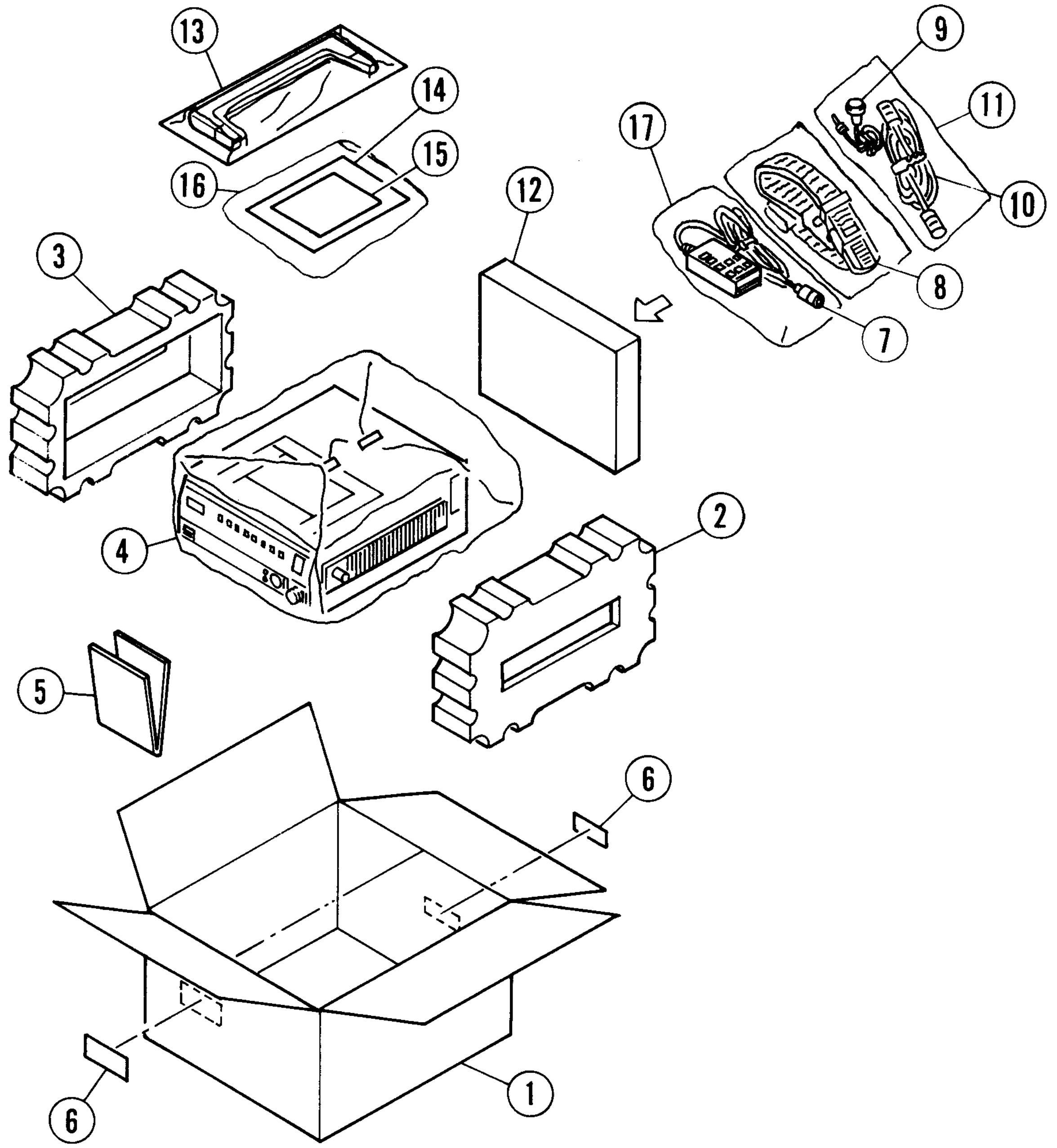
7-6. SUB DECK BLOCK 7-7
7-7. DRUM BLOCK 7-8
7-8. CASSETTE HOUSING BLOCK 7-8
7-9. REMOTE CONTROL UNIT 7-9

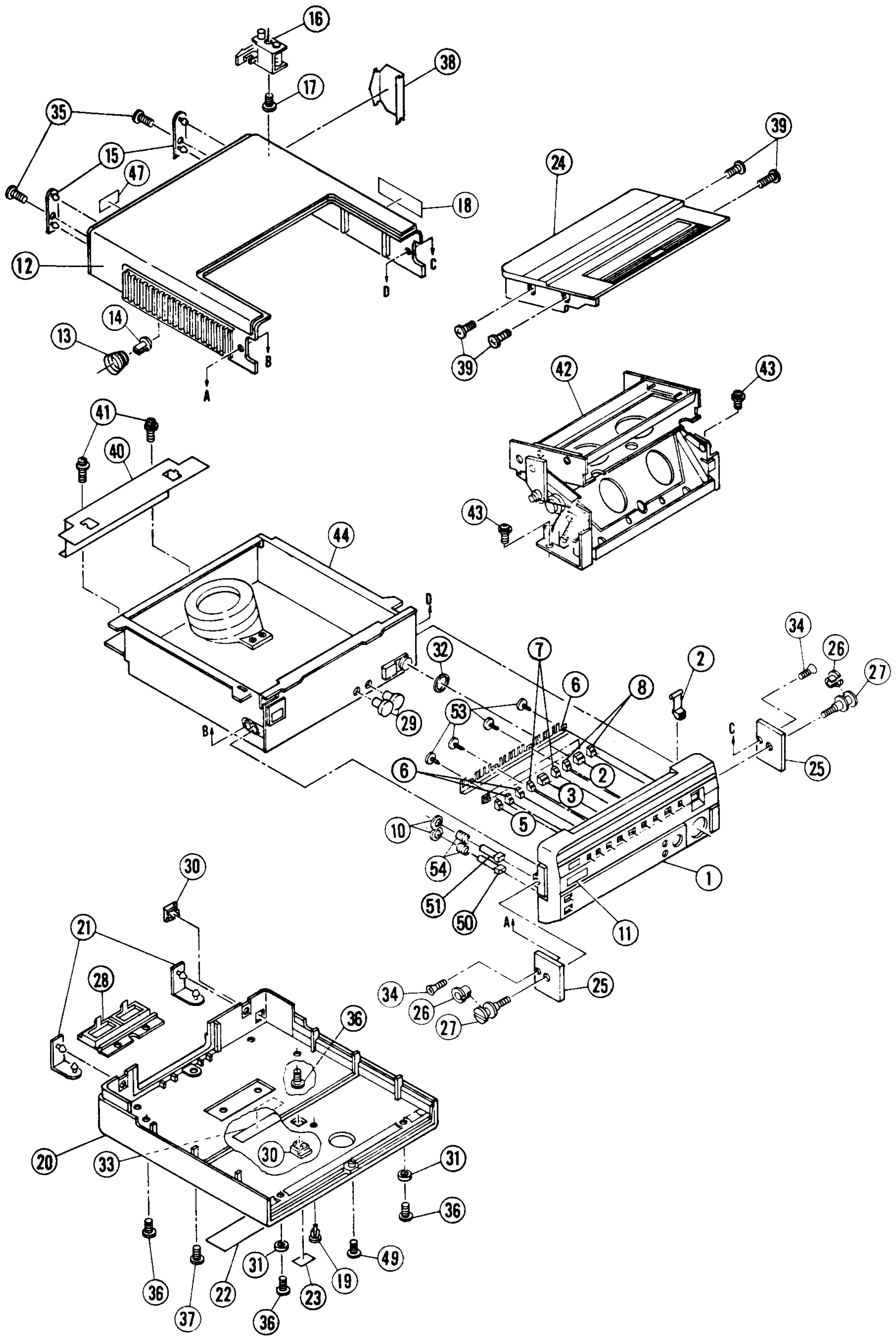
PACKING BLOCK



7-1. PACKING BLOCK

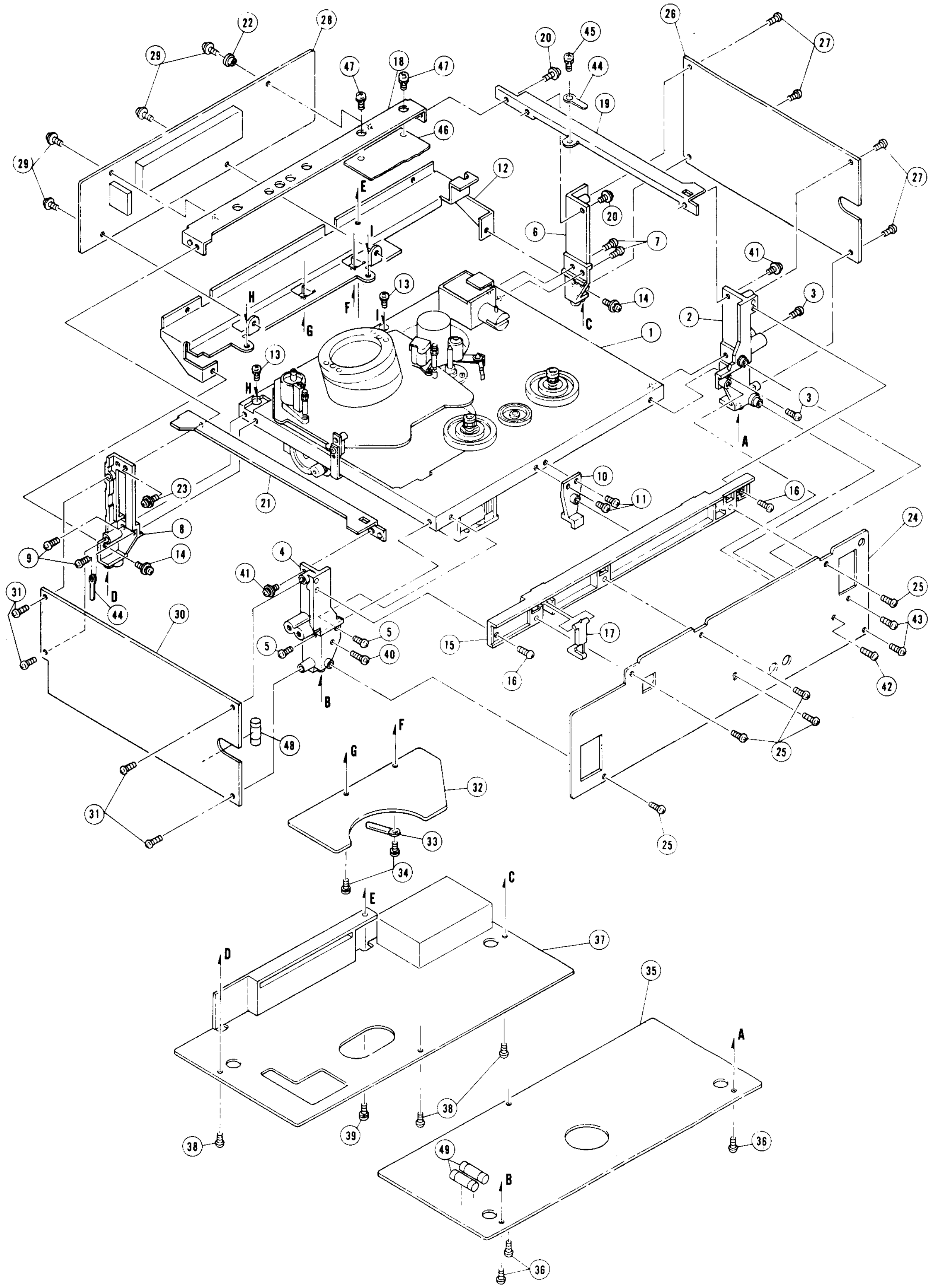
REF. NO.	PARTS NO.	DESCRIPTION
1-8	AX709842	SHOULDER STRAP
1-9	AX705742	EARPHONE
1-10	EW705743	AERIAL CABLE ASSY (EG, EK)
1-10	EW705435	AERIAL CABLE ASSY (S)
1-13	AX709839	CARRYING HANDLE
1-18	AX709840	ANTENNA SELECTOR SWITCH (EG,S)

CABINET BLOCK



7-2. CABINET BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
2-1	BD705593	PANEL FRONT BLK VP-77EG (INCL. 2-11, 50-55)
2-1	BD709836	PANEL FRONT BLK VP-77EK (INCL. 2-11, 50-55)
2-1	BD705744	PANEL FRONT BLK VP-77S (INCL. 2-11, 50-55)
2-2	SK705594	KNOB (EJECT)
2-3	SB705595	BUTTON SELECT (PLAY)
2-4	SB705596	BUTTON SELECT (STOP)
2-5	SB705597	BUTTON SELECT (PAUSE/STILL)
2-6	SB705599	BUTTON SELECT (SOUND DUB, REC)
2-7	SB705601	BUTTON SELECT (REVIEW, CUE)
2-8	SB705602	BUTTON SELECT (REW, FF)
2-10	ZW705603	PW
2-12	SP705604	COVER UPPER BLK VP-77EG/EK (INCL. 13-17)
2-12	BD705746	COVER UPPER BLK VP-77S (INCL. 13-17)
2-13	ZG705605	SP
2-14	VT705606	CAP
2-15	VT705607	SUPPORTER RUBBER (A)
2-16	BV705608	BATTERY STOPPER BLK
2-19	ZW705609	RV NYL
2-20	BV705610	BOTTOM PLATE BLK VP-77EG/EK (INCL. 21)
2-20	BV705747	BOTTOM PLATE BLK VP-77S (INCL. 21)
2-21	VT705612	SUPPORTER RUBBER (B)
2-24	BD705613	CASSETTE COVER BLK VP-77EG
2-24	BD709837	CASSETTE COVER BLK VP-77EK
2-24	VT705748	CASSETTE COVER BLK VP-77S
2-25	SP705614	SIDE PLATE VP-77
2-26	VT705615	COLLAR
2-27	ZS705616	HOOK SCREW
2-28	SP705617	CONNECTOR COVER BLK (EG/EK)
2-28	BV705749	CONNECTOR COVER BLK (S)
2-29	SK705618	KNOB (TRACKING)
2-30	VT705619	CAP
2-31	SA705620	FOOT
2-34	ZS608793	OSC30x10STL NI3
2-35	ZS355511	BID30x06STL BNI
2-36	ZS522865	T2BR30x12STL BNI
2-37	ZS309315	T2BR30x10STL BNI
2-38	SP705621	COVER VP-77
2-39	ZS426611	BID30x12STL NI3
2-42	BV705624	CASSETTE HOUSING BLK
2-49	ZS705625	T1BR30x16STL BNI
2-50	SK705626	KNOB POWER
2-51	SK705627	KNOB REC LOCK
2-52	ZG705628	SP BUTTON
2-53	ZS705629	T1BR26x06STL CMT
2-54	ZG705630	SP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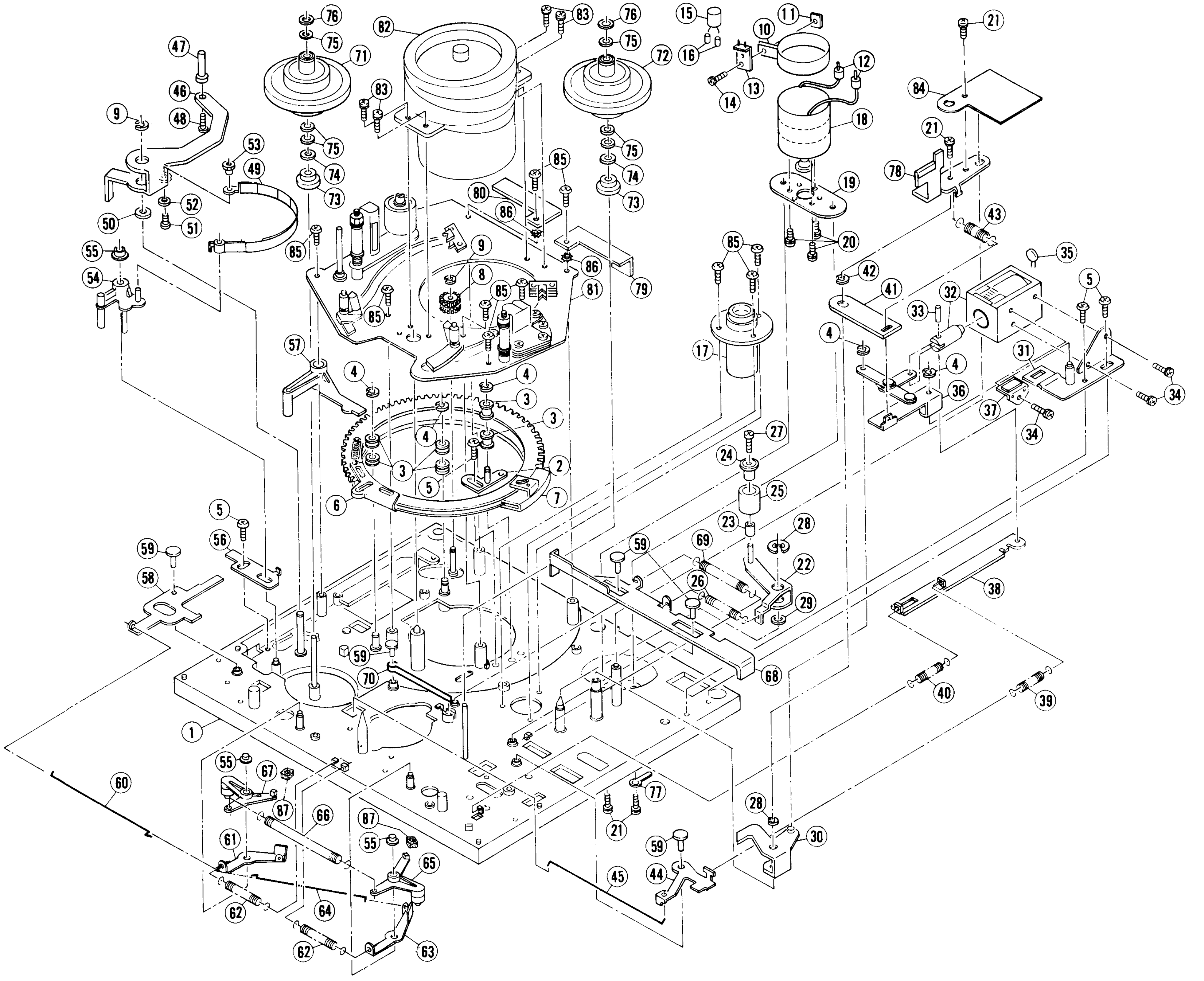
7-3. CHASSIS BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
3-2	BV705631	FRONT SUPPORTER (R) BLK
3-4	BV705632	FRONT SUPPORTER (L) BLK
3-6	VT705633	REAR SUPPORTER (R)
3-8	VT705634	REAR SUPPORTER (L)
3-10	EA705635	ADAPTER PC
3-15	VT705636	FRONT BEAM
3-17	ML705637	LEVER REC SAFETY
3-48	EF740969	⚠ FUSE 250V 1A (F1)
3-49	EF703608	⚠ FUSE 250V 2A (F2,3)

MAIN DECK (1) BLOCK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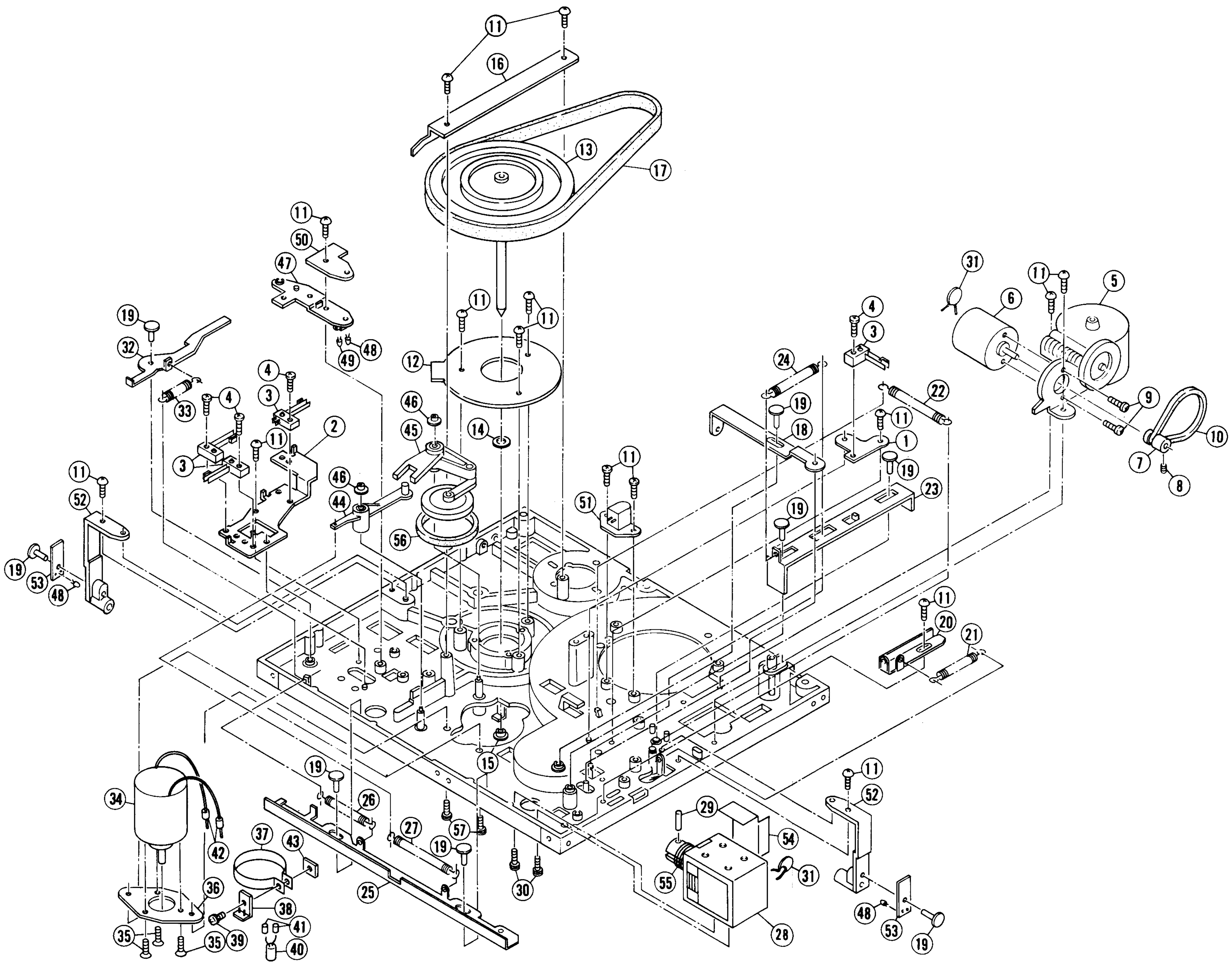
7-4. MAIN DECK (1) BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
4-2	BV705639	PLATE BLK
4-3	MR702533	PULLEY
4-6	BV705640	SUPPLY LOADING RING BLK
4-7	BV705641	TAKE UP LOADING RING BLK
4-8	VT705642	GEAR (A)
4-12	VT740831	FERRITE BEADS
4-13	VT740830	FEED THROUGH/C. ASSY
4-17	BV705643	CAPSTAN HOLDER BLK
4-18	BM705644	CAPSTAN MOTOR BLK
4-22	BV705645	PINCH ROLLER ARM BLK
4-23	VT705646	COLLAR
4-24	VT705647	CAP
4-25	MP702901	PINCH ROLLER ASSY
4-26	ZG701938	SP
4-30	BV705648	PINCH ROLLER LEVER BLK
4-32	EP705649	PLUNGER
4-35	ED709698	D VARISTOR
4-36	BV705651	LEVER BLK
4-37	BV705652	DEW SENSOR BLK
4-38	VT705653	PINCH SLIDE PLATE
4-39	ZG705654	SP
4-40	ZG700886	SP
4-43	ZG705656	SP
4-44	VT705657	SKEW LEVER
4-45	VT705658	ROD
4-46	VT705659	TENSION ARM
4-47	VT705660	TENSION POLE
4-49	BV705661	TENSION BAND BLK
4-54	VT705662	SKEW ARM
4-55	VT705663	CAP
4-57	VT705664	CANCEL LEVER
4-58	VT705665	LEVER
4-59	VT705667	STOPPER
4-60	VT705668	ROD (2)
4-61	BV705669	SUPPLY TENSION BRAKE BLK
4-62	ZG705670	SP
4-63	BV705671	TAKE UP TENSION BRAKE BLK
4-64	VT705672	ROD (3)
4-66	ZG705674	SP
4-68	VT705676	SLIDE LEVER
4-69	ZG740735	SP
4-70	ZG705679	SP LEAF
4-71	VT705680	SUPPLY REEL DISK BLK
4-72	BV705681	TAKE UP REEL DISK BLK
4-73	VT740695	COLLAR
4-74	ZW740694	PW 0.5T
4-75	ZW740693	PW 0.25T
4-76	EJ702536	PW SLIT
4-78	BV705682	CASSETTE DOOR GUIDE BLK
4-87	VT705683	BRAKE SHOE
4-88	VT705673	MAIN BRAKE ASSY (INCL. 65, 67, 87)

MAIN DECK (2) BLOCK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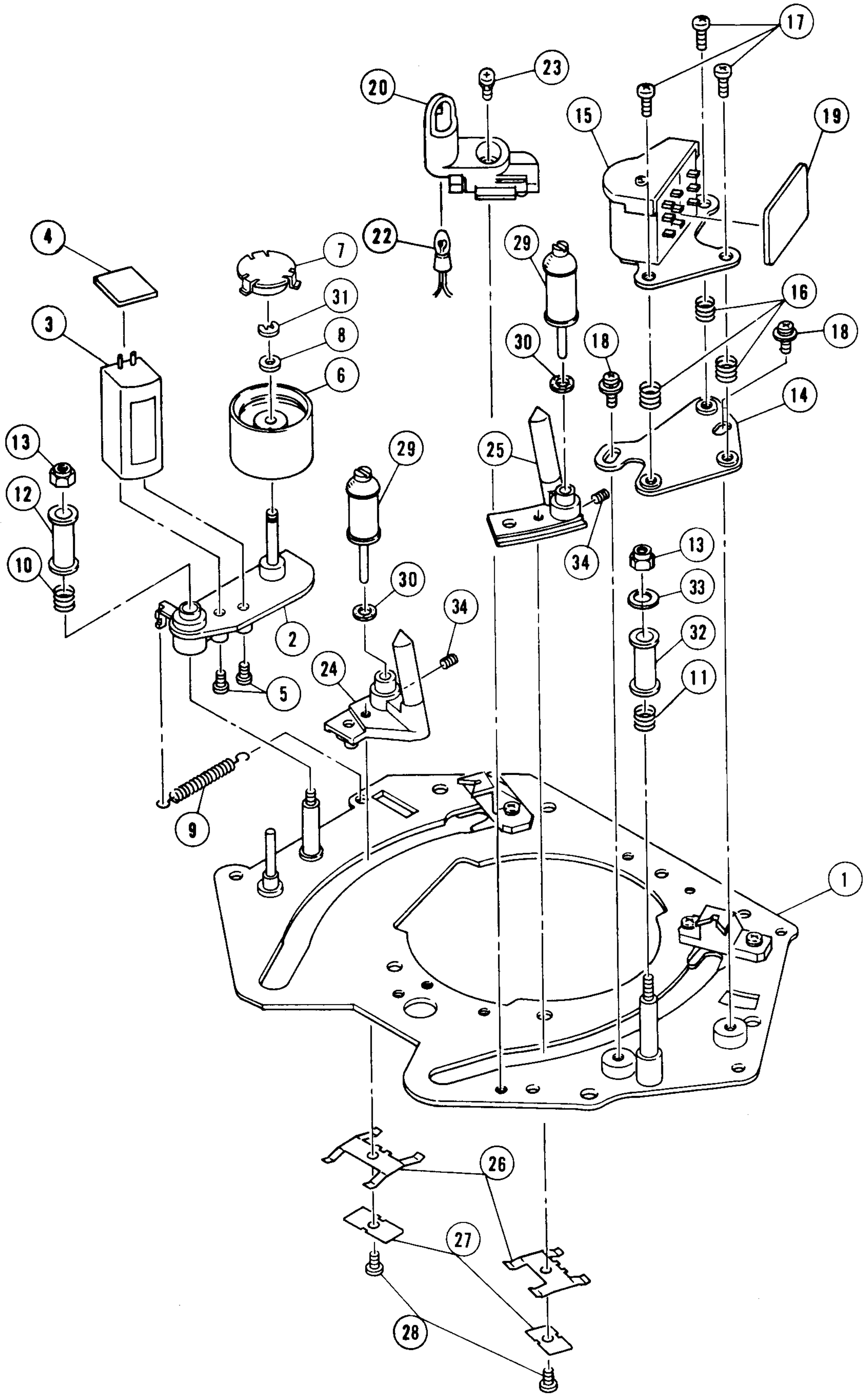
7-5. MAIN DECK (2) BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
5-3	ES709710	SW LEAF
5-5	BV705685	LOADING GEAR BLK
5-6	BM704620	LOADING MOTOR
5-7	MR702767	MOTOR PULLEY ASSY (INCL. 8)
5-10	MB705686	BELT VP-77
5-13	BV705687	CAPSTAN FLYWHEEL BLK
5-14	ZW705689	WASHER
5-15	VT705691	SHIELD CAP
5-16	BV705692	STAY BLK
5-17	MB705693	BELT
5-18	VT705694	SHIELD PLATE
5-21	ZG705695	SP
5-22	ZG705696	SP
5-23	VT705697	AFTER LOADING PLATE
5-24	ZG740713	SP
5-25	VT705698	MAIN SLIDE PLATE
5-26	ZG705699	SP
5-27	ZG705699	SP
5-28	EP705649	PLUNGER
5-31	ED709698	D VARISTOR
5-32	VT705703	EJECT LOCK LEVER
5-33	ZG740785	SP
5-34	BM705704	REEL MOTOR BLK
5-44	VT705705	IDLER LEVER (3)
5-45	BV705706	IDLER BLK (INCL. 56)
5-47	VT705707	PHOTO COUPLER
5-48	ET741224	TR PHOT PN202S
5-49	ED705708	D LED TLR108D
5-51	BH705709	PICK UP HEAD BLK
5-55	ZG705710	SP COMPRESSION

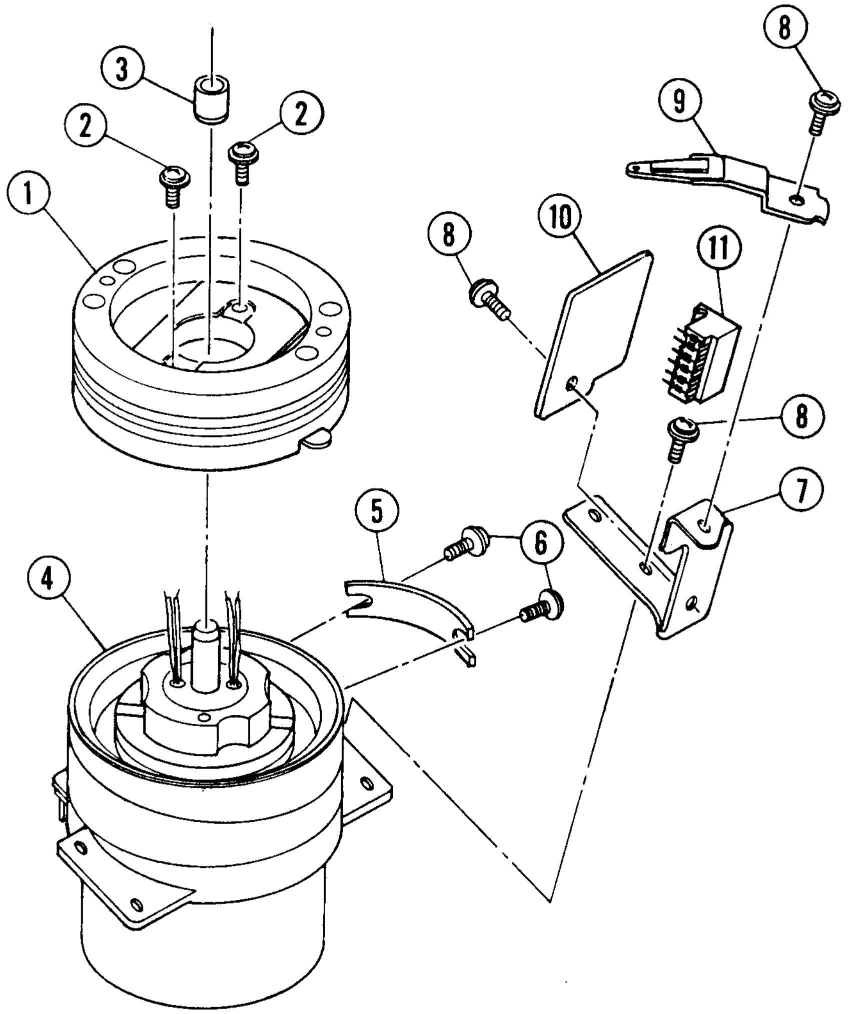
SUB DECK BLOCK



7-6. SUB DECK BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
6-2	VT704625	HEAD E ARM SUB ASSY
6-3	HE701892	HEAD E FULL
6-6	MI706043	SU IMPEDANCE ROLLER ASSY
6-7	MV704631	THRUST BEARING
6-9	ZG702903	SP
6-10	ZG704633	SP
6-11	ZG740775	SP
6-12	MS704634	GUIDE POLE
6-13	ZW704635	N NYLON
6-15	BH705713	AUDIO/CTL HEAD BLK
6-16	ZG740775	SP
6-17	ZS421806	PAN30x08STL CMT
6-18	ZS702889	SCREW
6-20	VT704644	LAMP HOLDER
6-22	EL703662	CASSETTE LAMP
6-24	VT704657	SUPPLY POLE BASE ASSY
6-25	VT704661	TAKE UP POLE BASE ASSY
6-26	ZG704673	SP PLATE
6-27	VT705716	PLATE
6-28	ZS608220	PAN26x06STL CMT
6-29	BV705717	GUIDE ROLLER BLK
6-30	VT704690	RUBBER TIRE
6-31	ZW705718	RING E
6-32	VT705719	GUIDE POLE
6-33	VT705720	TAP GUIDE

DRUM BLOCK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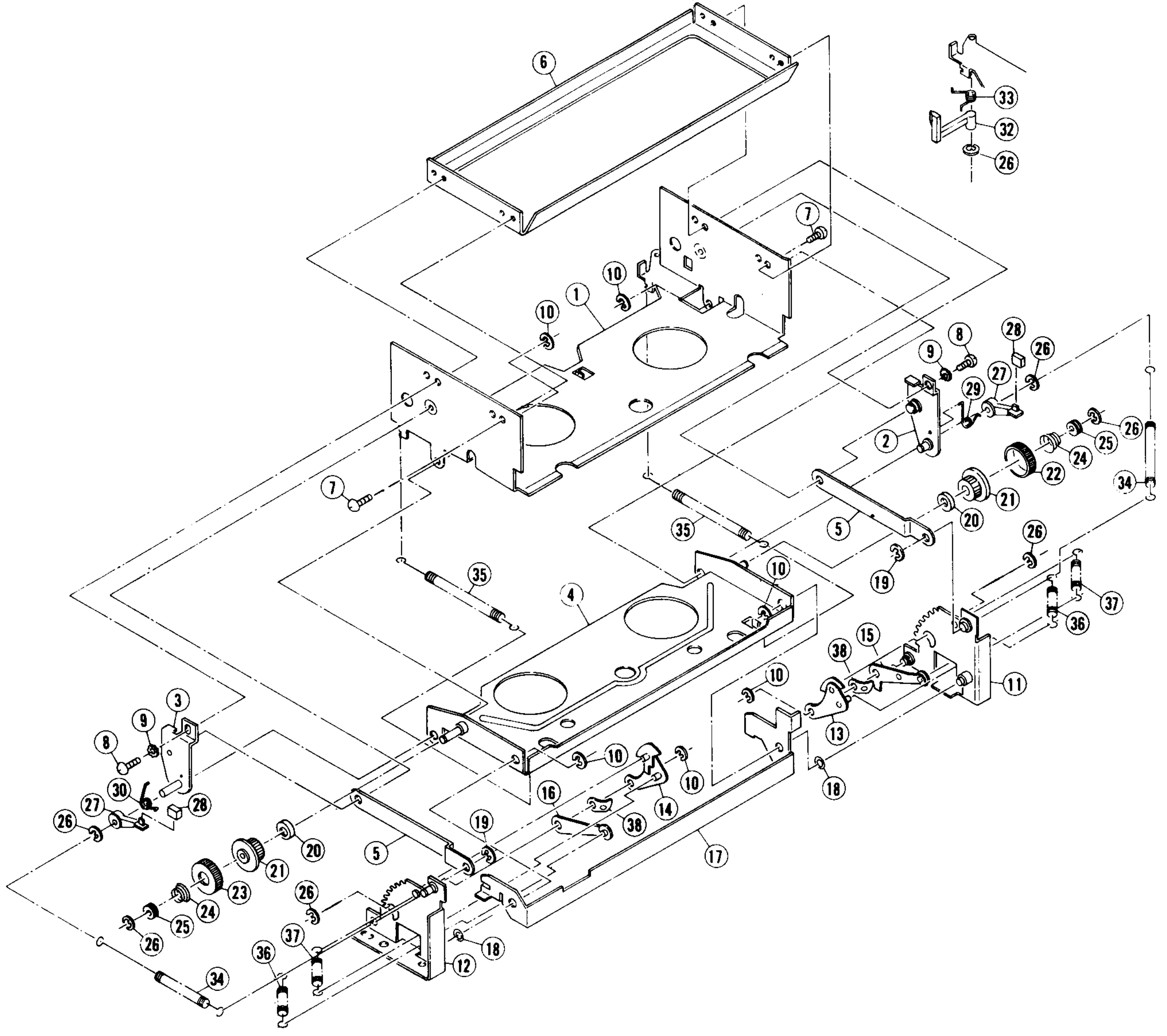
7-7. DRUM BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
7-1	BV705721	UPPER DRUM BLK
7-2	ZS705722	SCREW
7-3	ZS704693	COMMUTATOR
7-4	BH704706	LOWER DRUM ASSY VS-10
7-5	BV705725	HEATER BLK VP-77
7-6	ZS704708	SCREW
7-9	VT704709	BRUSH ASSY VS-10

CASSETTE HOUSING BLOCK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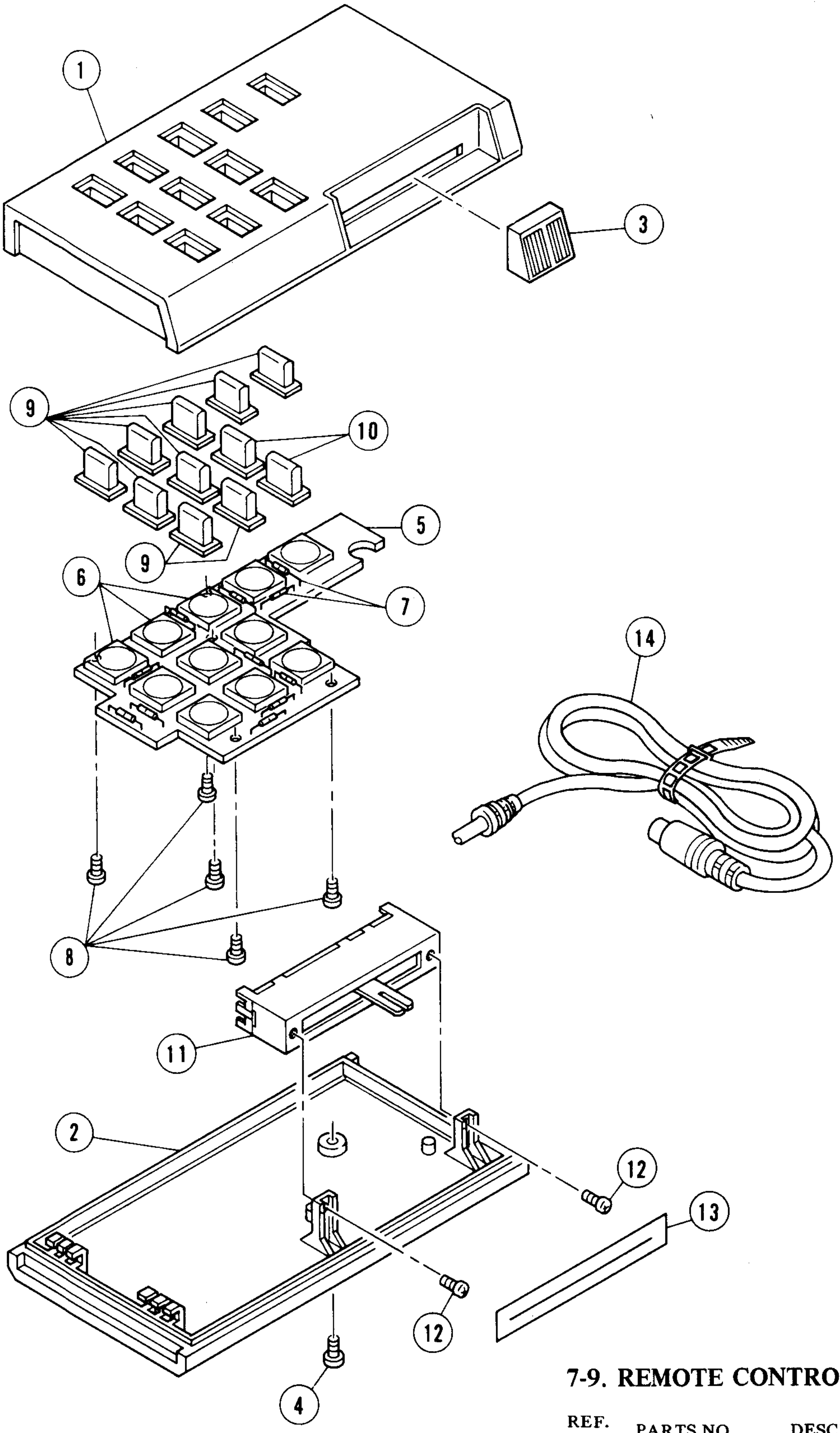
7-8. CASSETTE HOUSING BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
8-21	VT705726	FRICTION PLATE
8-22	VT705727	BRAKE DRUM (R)
8-23	VT705728	BRAKE DRUM (L)
8-24	ZG705729	SP FRICTION
8-25	ZG705730	SP ROLLER
8-27	VT705731	RUBBER HOLDER
8-28	VT705732	RUBBER TIRE
8-29	ZG705733	SP TORSION
8-30	ZG705735	SP TORSION (2)
8-32	VT705736	LID OPENER
8-33	ZG705737	SP TORSION
8-34	ZG705738	SP LIFT
8-35	ZG705739	SP HOLD
8-36	ZG705740	SP
8-37	ZG705741	SP
8-45	BV705624	CASSETTE HOUSING BLK

REMOTE CONTROL UNIT



7-9. REMOTE CONTROL UNIT

REF. NO.	PARTS NO.	DESCRIPTION
9-6	ES709824	SW PUSH
9-7	ED709825	D SILICON 1S2075
9-11	EV709826	VR SLIDE 474
9-14	EW709827	CABLE ASSY
9-15	BV709843	REMOTE CONTROL UNIT VP-77EG (EG/EK)
9-15	BV709844	REMOTE CONTROL UNIT VP-77S

SECTION 8

CHARTS AND DIAGRAMS

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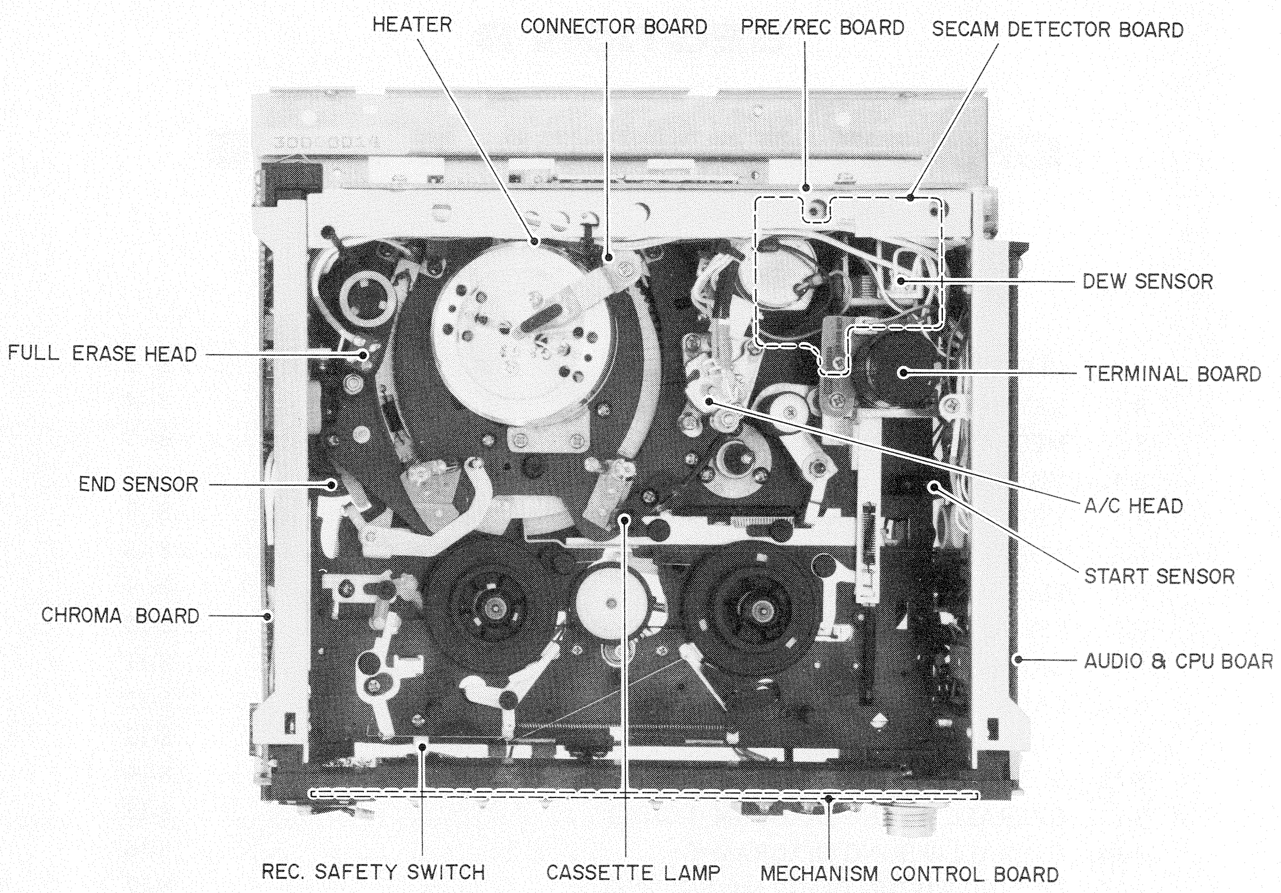
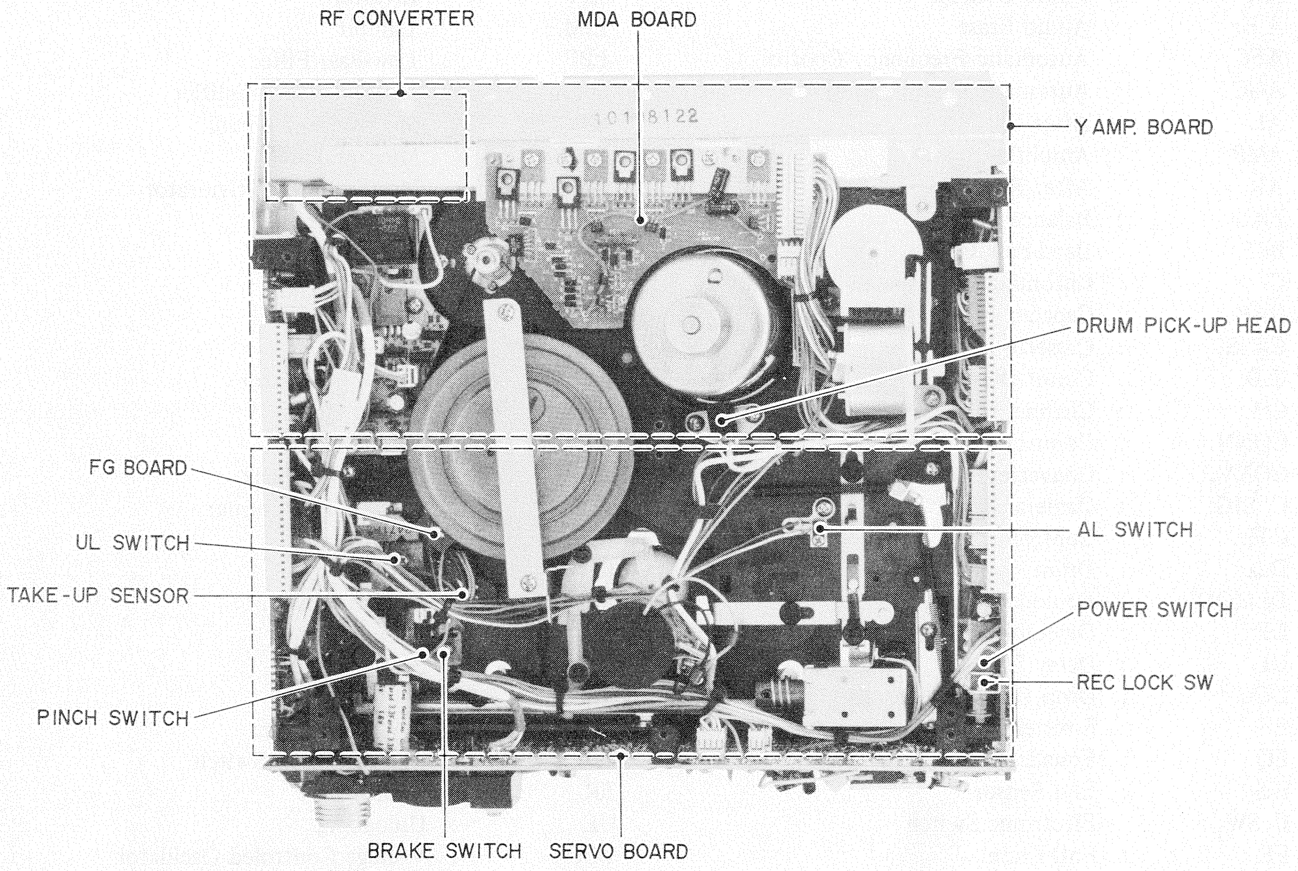
8-1. ELECTRICAL PARTS LOCATION


HEATER
CONNECTOR BOARD
PRE/REC BOARD
SECAM DETECTOR BOARD
DEW SENSOR
TERMINAL BOARD
A/C HEAD
START SENSOR
AUDIO & CPU BOAR
FULL ERASE HEAD
END SENSOR
CHROMA BOARD
REC. SAFETY SWITCH
CASSETTE LAMP
MECHANISM CONTROL BOARD

(a) Top View

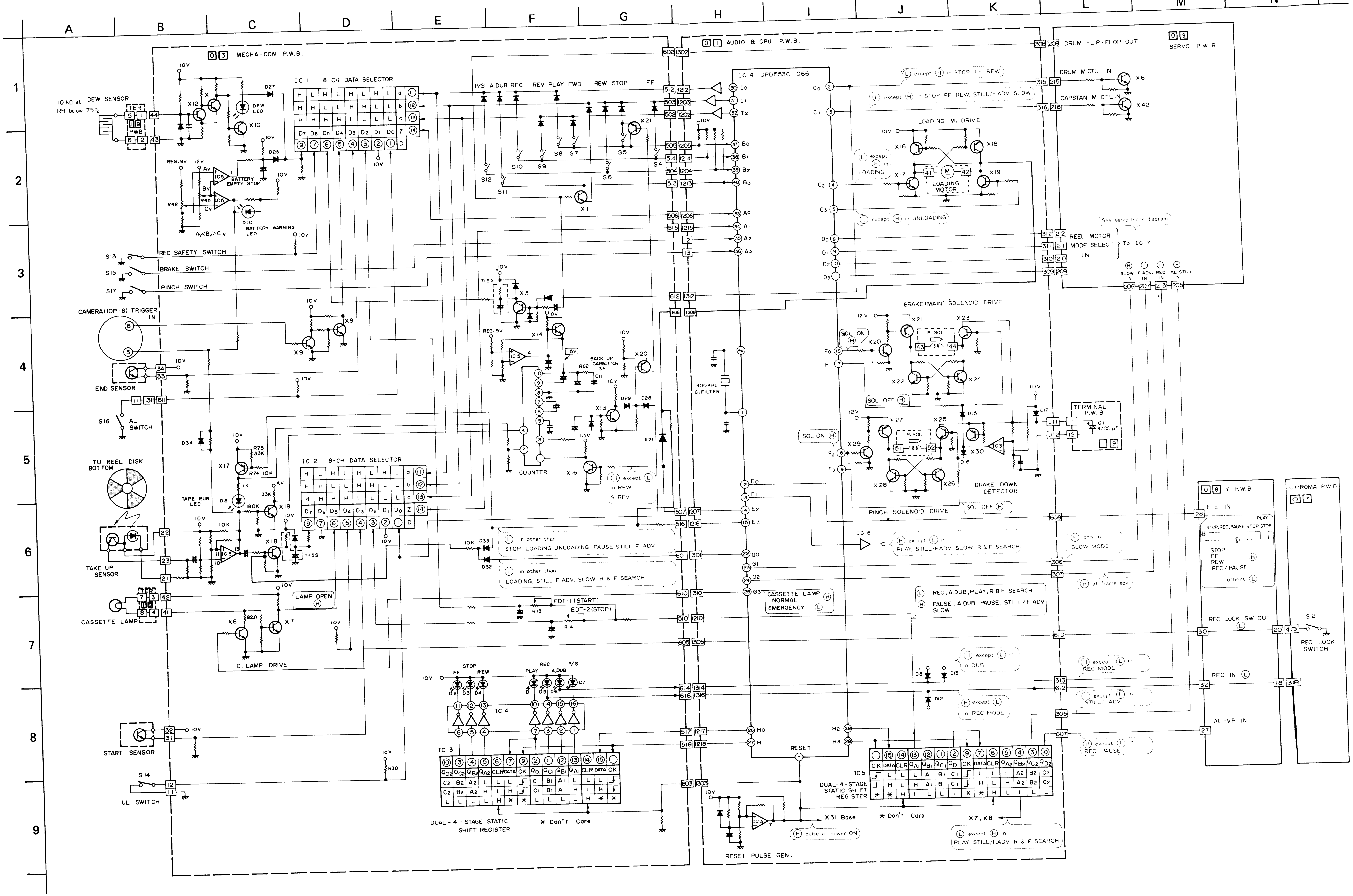

RF CONVERTER
MDA BOARD
Y AMP. BOARD
DRUM PICK-UP HEAD
FG BOARD
UL SWITCH
TAKE-UP SENSOR
AL SWITCH
POWER SWITCH
REC LOCK SW
PINCH SWITCH
BRAKE SWITCH
SERVO BOARD

(b) Bottom View

8-2. KEY TO ABBREVIATIONS

ACC : Automatic Color Control
A/C : Audio/Control
A.E. : Audio Erase
AFC : Automatic Frequency Control
AGC : Automatic Gain Control
AL : After Loading
AMP : Amplifier
AR : After Recording
BAL : Balance
BPF : Band-Pass Filter
C : Chrominance, Capstan
CAP. : Capstan
CASS. : Cassette
C.D. : Count Down
CH. : Channel
CONN. : Connector
CONV. : Converter
C. SIG. : Camera Signal
CTL. : Control
D. : Drum
DEMOD. : Demodulator
DET. : Detector
DL : Delay Line
DOC : Drop Out Compensator
EF : Emitter Follower
EQ : Equalizer
E.S. : End Sensor
E. SW : Electronic Switch
FE : Full Erase
FF IN : Flip-Flop Input
FG : Frequency Generator
FR : Full Recording
FWD : Forward
GEN : Generator
HPF : High-Pass Filter
INV : Inverter
LIM. : Limiter
LPF : Low-Pass Filter
MDA : Motor Drive Amplifier
MECHACON : Mechanism Control
MIC : Microphone
MM : Monostable Multivibrator
MOD. : Modulator
OPE. : Operation
OSC : Oscillator
P.B. : Playback
P/S : Pause/Still
P. TR. : Power Transistor
REG. : Regulator
REV. : Reverse
R/P : Record/Playback
R.T. : Rotary Transformer
RY : Relay
SENS. : Sensor
SF : Source Follower
SOL. : Solenoid
S.S. : Start Sensor
SW : Switch
SYNC SEP : Sync Separator
T. LEAD SW : Thermal Lead Switch
TR : Transistor
UL : Unloading
VCO : Voltage Controled Oscillator
VP. : Video Play
V. PULSE : Vertical Sync Pulse
VR : Variable Resistor
Y : Luminance

8-3. MECHANISM CONTROL BLOCK DIAGRAM (EG/EK/S)



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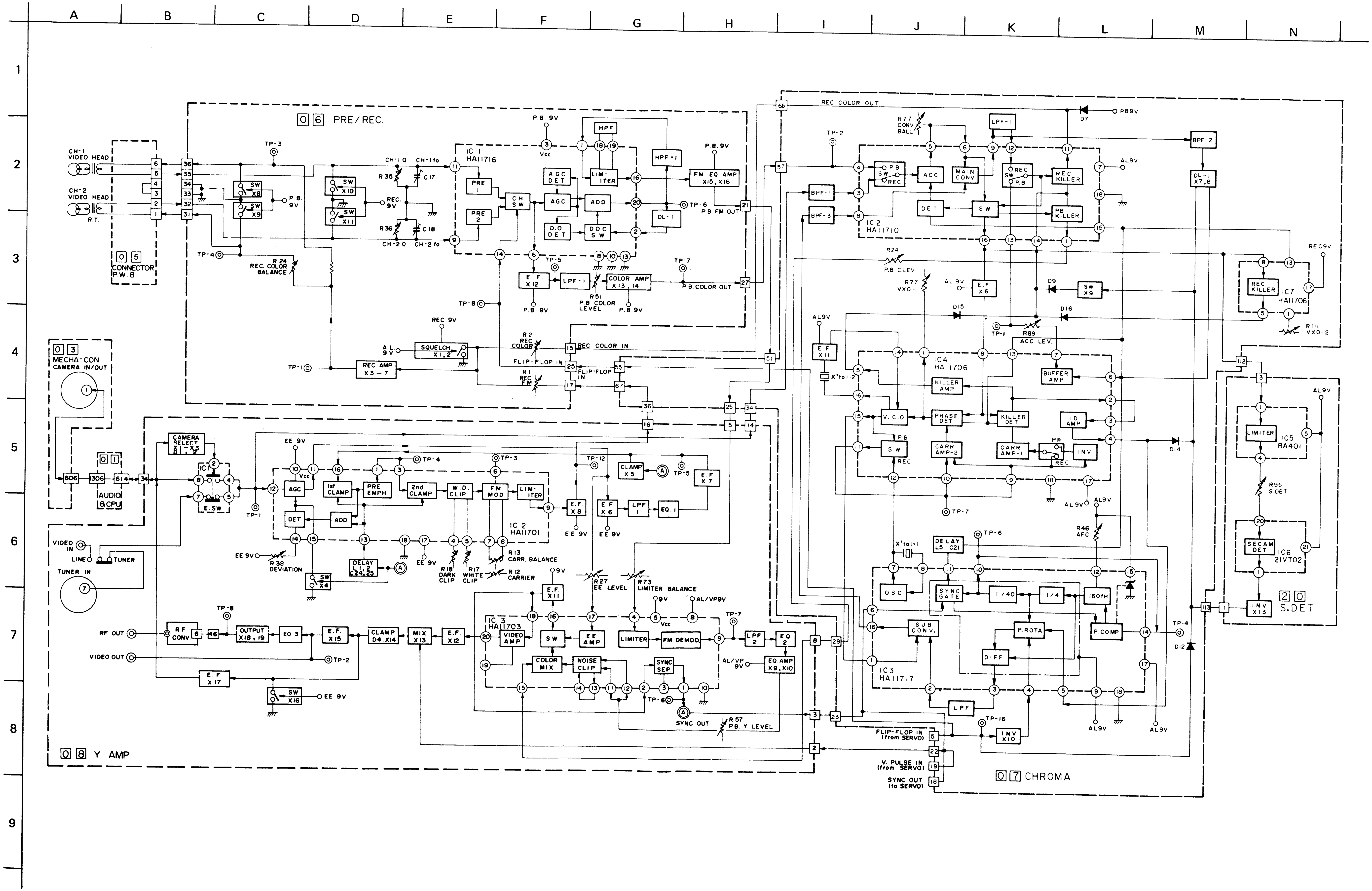
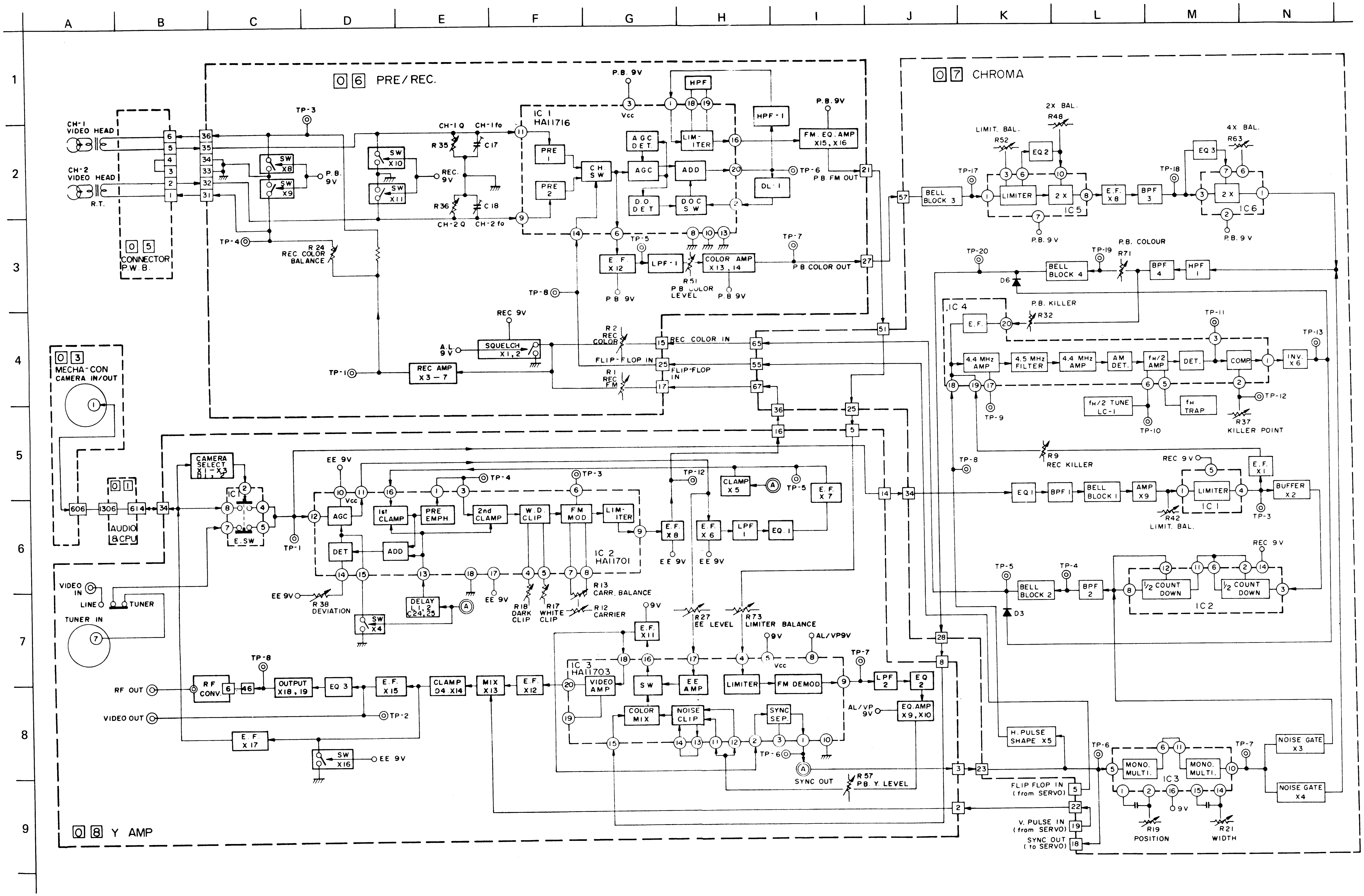
03 MECHA-CON P.W.B.
01 AUDIO & CPU P.W.B.
09 SERVO P.W.B.
08 Y P.W.B.
CHROMA P.W.B. 07
10 kΩ at RH below 75%
DEW SENSOR
TER PWB
DEW LED
IC 1 8-CH DATA SELECTOR
BATTERY EMPTY STOP
BATTERY WARNING LED
Av<Bv>Cv
REC SAFETY SWITCH
BRAKE SWITCH
PINCH SWITCH
S13
S15
S17
CAMERA(10P-6) TRIGGER IN
END SENSOR
S16 AL SWITCH
TU REEL DISK BOTTOM
TAPE RUN LED
TAKE UP SENSOR
CASSETTE LAMP
LAMP OPEN Ⓗ
C LAMP DRIVE
START SENSOR
S14
UL SWITCH
IC 2 8-CH DATA SELECTOR
P/S A.DUB REC REV PLAY FWD REW STOP FF
S12 S11 S10 S9 S8 S7 S5 S6 S4
COUNTER
BACK UP CAPACITOR 3F
Ⓗ except Ⓛ in REW S-REV
Ⓛ in other than STOP, LOADING UNLOADING, PAUSE STILL F ADV
Ⓛ in other than LOADING, STILL F ADV, SLOW R & F SEARCH
EDT-1 (START)
EDT-2 (STOP)
STOP FF REW
REC P/S PLAY A.DUB
IC 3
IC 4
DUAL-4-STAGE STATIC SHIFT REGISTER
✱ Don't Care
IC 4 UPD553C-066
400KHz C.FILTER
RESET
RESET PULSE GEN.
Ⓗ pulse at power ON
X31 Base
X7, X8
Ⓛ except Ⓗ in STOP, FF, REW
Ⓛ except Ⓗ in STOP, FF, REW, STILL/F.ADV, SLOW
LOADING M. DRIVE
Ⓛ except Ⓗ in LOADING
LOADING MOTOR
Ⓛ except Ⓗ in UNLOADING
BRAKE (MAIN) SOLENOID DRIVE
SOL ON Ⓗ
SOL OFF Ⓗ
B. SOL
P. SOL
BRAKE DOWN DETECTOR
PINCH SOLENOID DRIVE
TERMINAL P.W.B.
C1 4700μF
IC 6
Ⓗ except Ⓛ in PLAY, STILL/F.ADV, SLOW, R & F SEARCH
CASSETTE LAMP NORMAL Ⓗ EMERGENCY Ⓛ
Ⓛ REC, A.DUB, PLAY, R & F SEARCH
Ⓗ PAUSE, A.DUB PAUSE, STILL/F.ADV SLOW
Ⓗ except Ⓛ in A DUB
Ⓗ except Ⓛ in REC MODE
IC 5 DUAL-4-STAGE STATIC SHIFT REGISTER
Ⓛ except Ⓗ in PLAY, STILL/F.ADV, R & F SEARCH
DRUM FLIP-FLOP OUT
DRUM M.CTL IN
CAPSTAN M CTL IN
REEL MOTOR MODE SELECT IN
See servo block diagram
To IC 7
SLOW IN
F.ADV. IN
REC IN
AL-STILL IN
Ⓗ only in SLOW MODE
Ⓗ at frame adv.
Ⓗ except Ⓛ in REC MODE
Ⓛ except Ⓗ in STILL/F.ADV
Ⓗ except Ⓛ in REC. PAUSE
E E IN
PLAY
STOP, REC, PAUSE, STOP STOP
STOP FF REW REC/PAUSE Ⓗ
others Ⓛ
REC LOCK SW OUT
REC IN Ⓛ
AL-VP IN
S2
REC LOCK SWITCH

8-4. VIDEO SYSTEM BLOCK DIAGRAM (EG/EK)



A B C D E F G H I J K L M N
1 2 3 4 5 6 7 8 9
06 PRE/REC.
CH-1 VIDEO HEAD
CH-2 VIDEO HEAD
R.T.
05 CONNECTOR P.W.B.
TP-3
SW X8
SW X9
P.B. 9V
SW X10
SW X11
REC. 9V
CH-1 Q
CH-1 fo
R 35
C 17
R 36
C 18
CH-2 Q
CH-2 fo
TP-4
R 24 REC COLOR BALANCE
IC 1 HA11716
PRE 1
PRE 2
CH SW
AGC DET.
AGC
D.O. DET
LIM-ITER
ADD
DOC SW
HPF
HPF-1
DL-1
P.B. 9V
Vcc
FM EQ. AMP X15, X16
TP-6
P.B FM OUT
TP-5
E.F X12
LPF-1
COLOR AMP X13, 14
R 51 P.B COLOR LEVEL
TP-7
P.B COLOR OUT
TP-8
REC 9V
AL 9V
SQUELCH X1, 2
R 2 REC COLOR
FLIP-FLOP IN
R 1 REC FM
REC COLOR IN
FLIP-FLOP IN
TP-1
REC AMP X3-7
03 MECHA-CON CAMERA IN/OUT
REC COLOR OUT
R 77 CONV BALL
LPF-1
D7
PB9V
TP-2
P.B SW REC
ACC
MAIN CONV
REC SW P.B
REC KILLER
AL9V
BPF-1
BPF-3
IC 2 HA11710
DET
SW
PB KILLER
BPF-2
DL-1 X7, 8
REC9V
R24 P.B C.LEV.
R 77 VXO-1
AL 9V
E.F X6
D9
SW X9
D15
D16
TP-1
R89 ACC LEV.
REC KILLER IC7 HA11706
R111 VXO-2
AL9V
E.F X11
X'tal-2
IC4 HA11706
KILLER AMP
BUFFER AMP
V.C.O
PHASE DET
KILLER DET
ID AMP
P.B SW REC
CARR AMP-2
CARR AMP-1
PB REC
INV
D14
LIMITER
IC5 BA401
R95 S.DET
SECAM DET
IC6 21VT02
INV X13
20 S.DET
TP-7
AL9V
R46 AFC
X'tal-1
DELAY L5 C21
TP-6
OSC
SYNC GATE
1/40
1/4
160fH
SUB CONV.
P.ROTA
P.COMP
D-FF
TP-4
D12
IC3 HA11717
LPF
TP-16
INV X10
FLIP-FLOP IN (from SERVO)
V. PULSE IN (from SERVO)
SYNC OUT (to SERVO)
07 CHROMA
CAMERA SELECT X1-X3
IC1
E.SW
01 AUDIO & CPU
EE 9V
TP-4
TP-3
Vcc
AGC
1st CLAMP
PRE EMPH
2nd CLAMP
W.D CLIP
FM MOD
LIM-ITER
DET
ADD
IC 2 HA11701
TP-12
CLAMP X5
TP-5
E.F X7
E.F X8
E.F X6
LPF 1
EQ 1
EE 9V
R 38 DEVIATION
DELAY L1, 2 C24, 25
SW X4
R18 DARK CLIP
R17 WHITE CLIP
R13 CARR. BALANCE
R12 CARRIER
R27 EE LEVEL
R73 LIMITER BALANCE
9V
AL/VP9V
VIDEO IN
LINE
TUNER
TUNER IN
RF OUT
VIDEO OUT
TP-8
RF CONV.
OUTPUT X18, 19
EQ 3
E.F. X15
CLAMP D4, X14
MIX X13
E.F. X12
TP-2
E.F X17
SW X16
EE 9V
E.F. X11
IC 3 HA11703
VIDEO AMP
SW
EE AMP
LIMITER
FM DEMOD
TP-7
LPF 2
EQ 2
COLOR MIX
NOISE CLIP
SYNC SEP.
AL/VP 9V
EQ. AMP X9, X10
TP-6
SYNC OUT
R 57 PB. Y LEVEL
08 Y AMP

8-5. VIDEO SYSTEM BLOCK DIAGRAM (S)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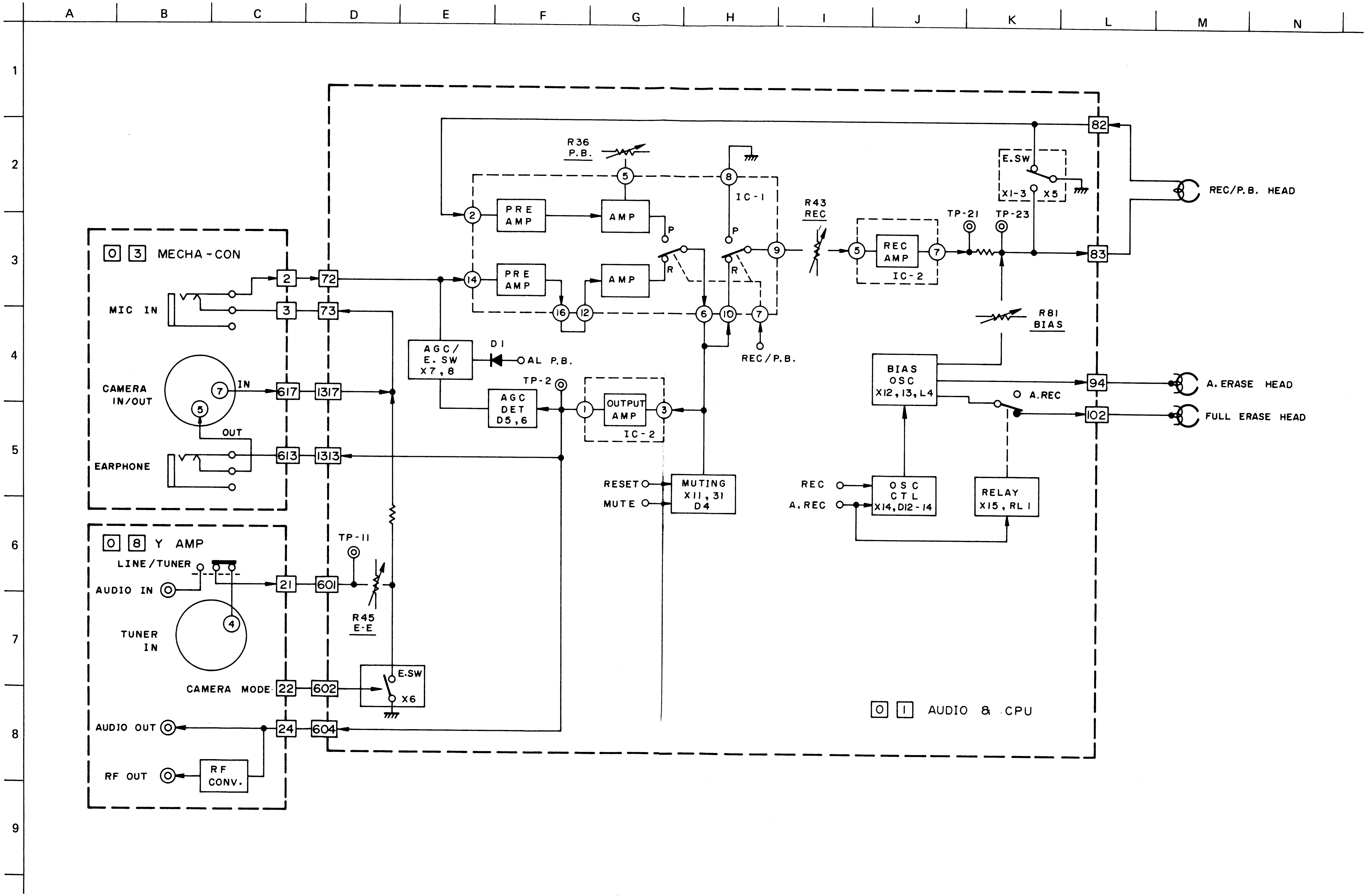
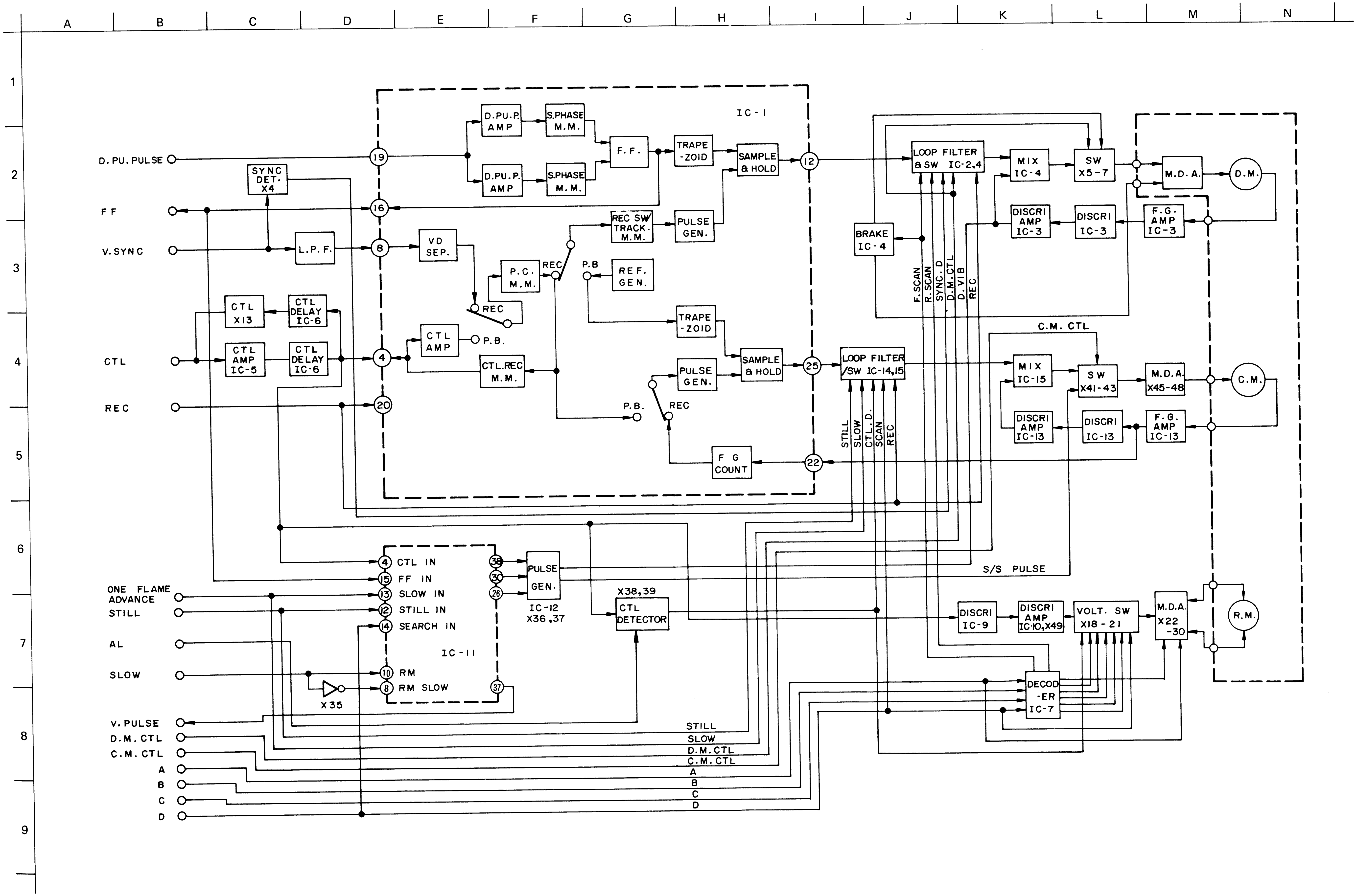
8
9
06 PRE/REC.
07 CHROMA
05 CONNECTOR P.W.B.
03 MECHA-CON CAMERA IN/OUT
01 AUDIO & CPU
08 Y AMP
CH-1 VIDEO HEAD
CH-2 VIDEO HEAD
R.T.
SW X8
SW X9
SW X10
SW X11
P.B. 9V
REC. 9V
TP-3
TP-4
TP-1
TP-8
R 24 REC COLOR BALANCE
CH-1 Q
CH-1 fo
CH-2 Q
CH-2 fo
R 35
C 17
R 36
C 18
IC 1 HA11716
PRE 1
PRE 2
CH SW
AGC DET
AGC
D.O. DET
LIM-ITER
ADD
DOC SW
HPF
HPF-1
DL-1
FM. EQ. AMP X15, X16
TP-6 P.B FM OUT
Vcc
E. F. X12
LPF-1
COLOR AMP X13, 14
R 51 P.B COLOR LEVEL
P.B COLOR OUT
TP-5
TP-7
REC 9V
A.L. 9V
SQUELCH X1, 2
REC AMP X3-7
R 2 REC COLOR
R 1 REC FM
REC COLOR IN
FLIP-FLOP IN
BELL BLOCK 3
LIMIT. BAL.
R52
EQ 2
2X BAL.
R48
LIMITER
2 X
IC5
E. F. X8
BPF 3
TP-17
TP-18
4X BAL.
R63
EQ 3
2 X
IC6
P.B. 9V
TP-20
TP-19
R71
P.B. COLOUR
BELL BLOCK 4
BPF 4
HPF 1
D6
IC 4
E. F.
P.B. KILLER
R32
TP-11
TP-13
4.4 MHz AMP
4.5 MHz FILTER
4.4 MHz AMP
AM DET.
fH/2 AMP
DET.
COMP.
INV. X6
fH/2 TUNE LC-1
fH TRAP
TP-9
TP-10
TP-12
R37 KILLER POINT
R9 REC KILLER
REC 9V
E. F. X1
EQ 1
BPF 1
BELL BLOCK 1
AMP X9
LIMITER
IC 1
BUFFER X2
R42 LIMIT. BAL.
TP-3
BELL BLOCK 2
BPF 2
1/2 COUNT DOWN
1/2 COUNT DOWN
IC 2
D3
H. PULSE SHAPE X5
MONO. MULTI.
MONO. MULTI.
IC3
NOISE GATE X3
NOISE GATE X4
R19 POSITION
R21 WIDTH
9V
FLIP FLOP IN (from SERVO)
V. PULSE IN (from SERVO)
SYNC OUT (to SERVO)
CAMERA SELECT X1-X3 D1, 2
IC 1
E. SW
EE 9V
AGC
DET
ADD
1st CLAMP
PRE EMPH.
2nd CLAMP
W. D. CLIP
FM MOD
LIM-ITER
IC 2 HA11701
CLAMP X5
E. F. X7
E. F. X8
E. F. X6
LPF 1
EQ 1
R 38 DEVIATION
DELAY L1, 2 C24, 25
SW X4
R18 DARK CLIP
R17 WHITE CLIP
R 13 CARR. BALANCE
R 12 CARRIER
R27 EE LEVEL
R73 LIMITER BALANCE
AL/VP9V
E.F. X11
VIDEO IN
LINE
TUNER
TUNER IN
RF OUT
VIDEO OUT
RF CONV
OUTPUT X18, 19
EQ 3
E.F. X15
CLAMP D4 X14
MIX X13
E.F. X12
IC 3 HA11703
VIDEO AMP
SW
EE AMP
LIMITER
FM DEMOD
COLOR MIX
NOISE CLIP
SYNC SEP.
LPF 2
EQ 2
EQ. AMP X9, X10
AL/VP 9V
TP-2
E. F X17
SW X16
SYNC OUT
R 57 PB. Y LEVEL
TP-6

8-6. AUDIO SYSTEM BLOCK DIAGRAM (EG/EK/S)


A B C D E F G H I J K L M N
1 2 3 4 5 6 7 8 9
03 MECHA-CON
MIC IN
CAMERA IN/OUT
IN
OUT
EARPHONE
2
3
617
613
72
73
1317
1313
08 Y AMP
LINE/TUNER
AUDIO IN
TUNER IN
CAMERA MODE
AUDIO OUT
RF OUT
RF CONV.
21
22
24
601
602
604
TP-11
R45 E-E
E.SW X6
AGC/ E.SW X7,8
D1
AL P.B.
TP-2
AGC DET D5,6
OUTPUT AMP
IC-2
R36 P.B.
PRE AMP
AMP
IC-1
P
R
REC/P.B.
RESET
MUTE
MUTING X11,31 D4
R43 REC
REC AMP
TP-21
TP-23
E.SW
X1-3
X5
R81 BIAS
BIAS OSC X12,13,L4
A.REC
REC
A.REC
OSC CTL X14,D12-14
RELAY X15,RL1
82
83
94
102
REC/P.B. HEAD
A.ERASE HEAD
FULL ERASE HEAD
01 AUDIO & CPU

8-7. SERVO BLOCK DIAGRAM-(1) (EG/EK/S)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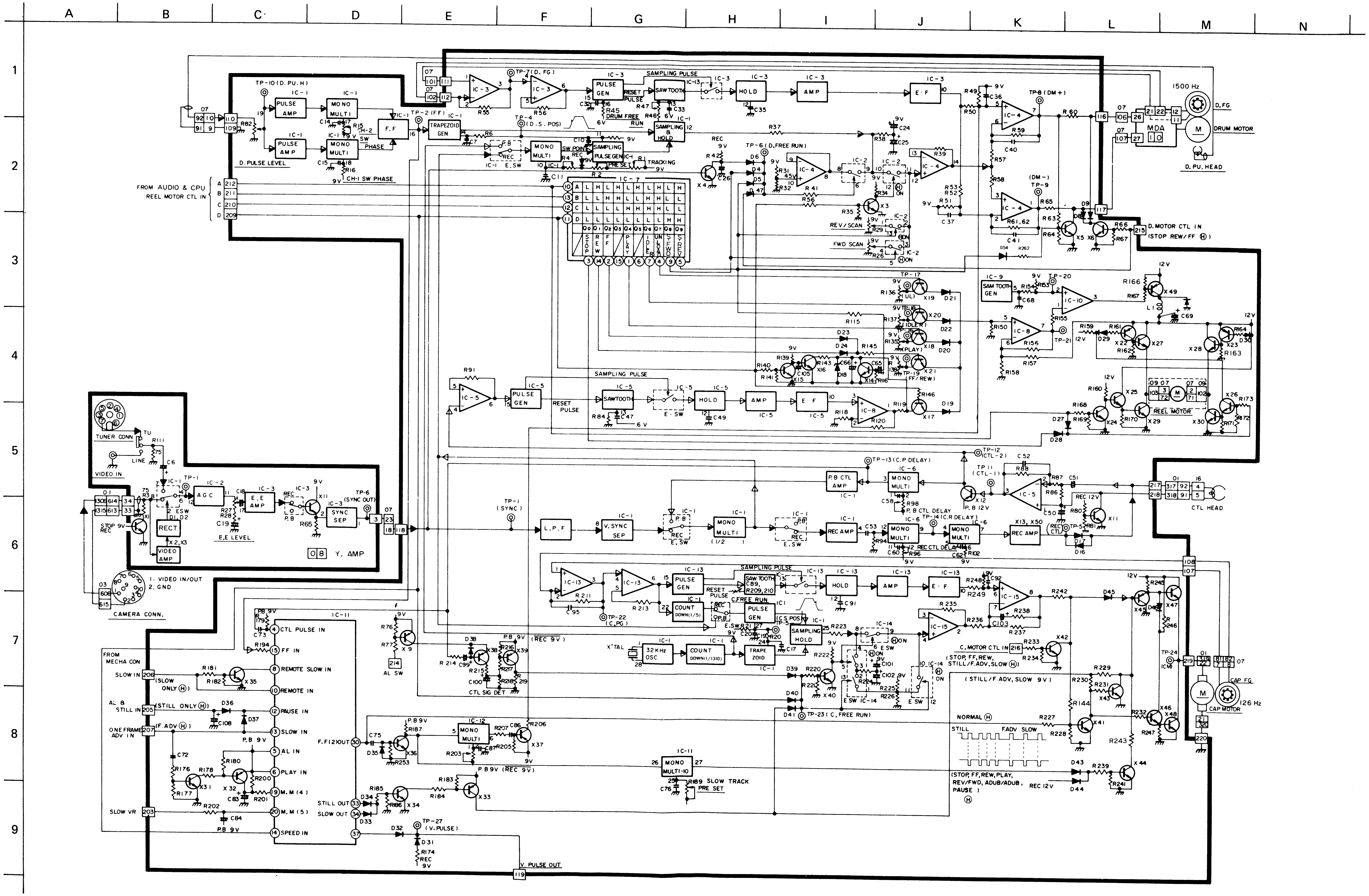
IC-1
D.PU.P. AMP
S.PHASE M.M.
F.F.
TRAPE -ZOID
SAMPLE & HOLD
D.PU.PULSE
SYNC DET. X4
FF
V.SYNC
L.P.F.
VD SEP.
REC SW TRACK. M.M.
PULSE GEN.
P.C. M.M.
REC
P.B
REF. GEN.
CTL X13
CTL DELAY IC-6
CTL AMP IC-5
CTL AMP
P.B.
CTL.REC M.M.
CTL
REC
F G COUNT
19
16
8
4
20
12
25
22
LOOP FILTER & SW IC-2,4
MIX IC-4
SW X5-7
M.D.A.
D.M.
DISCRI AMP IC-3
DISCRI IC-3
F.G. AMP IC-3
BRAKE IC-4
F.SCAN
R.SCAN
SYNC.D
D.M.CTL
D.VIB
REC
C.M. CTL
LOOP FILTER /SW IC-14,15
MIX IC-15
SW X41-43
M.D.A. X45-48
C.M.
DISCRI AMP IC-13
DISCRI IC-13
F.G. AMP IC-13
STILL
SLOW
CTL.D
SCAN
REC
S/S PULSE
ONE FLAME ADVANCE
STILL
AL
SLOW
V.PULSE
D.M.CTL
C.M.CTL
A
B
C
D
4 CTL IN
15 FF IN
13 SLOW IN
12 STILL IN
14 SEARCH IN
IC-11
10 RM
8 RM SLOW
37
38
30
26
X35
PULSE GEN.
IC-12 X36,37
X38,39
CTL DETECTOR
DISCRI IC-9
DISCRI AMP IC-10,X49
VOLT. SW X18-21
M.D.A. X22-30
R.M.
DECOD-ER IC-7
STILL
SLOW
D.M.CTL
C.M.CTL
A
B
C
D

8-8. SERVO BLOCK DIAGRAM-(2) (EG/EK/S)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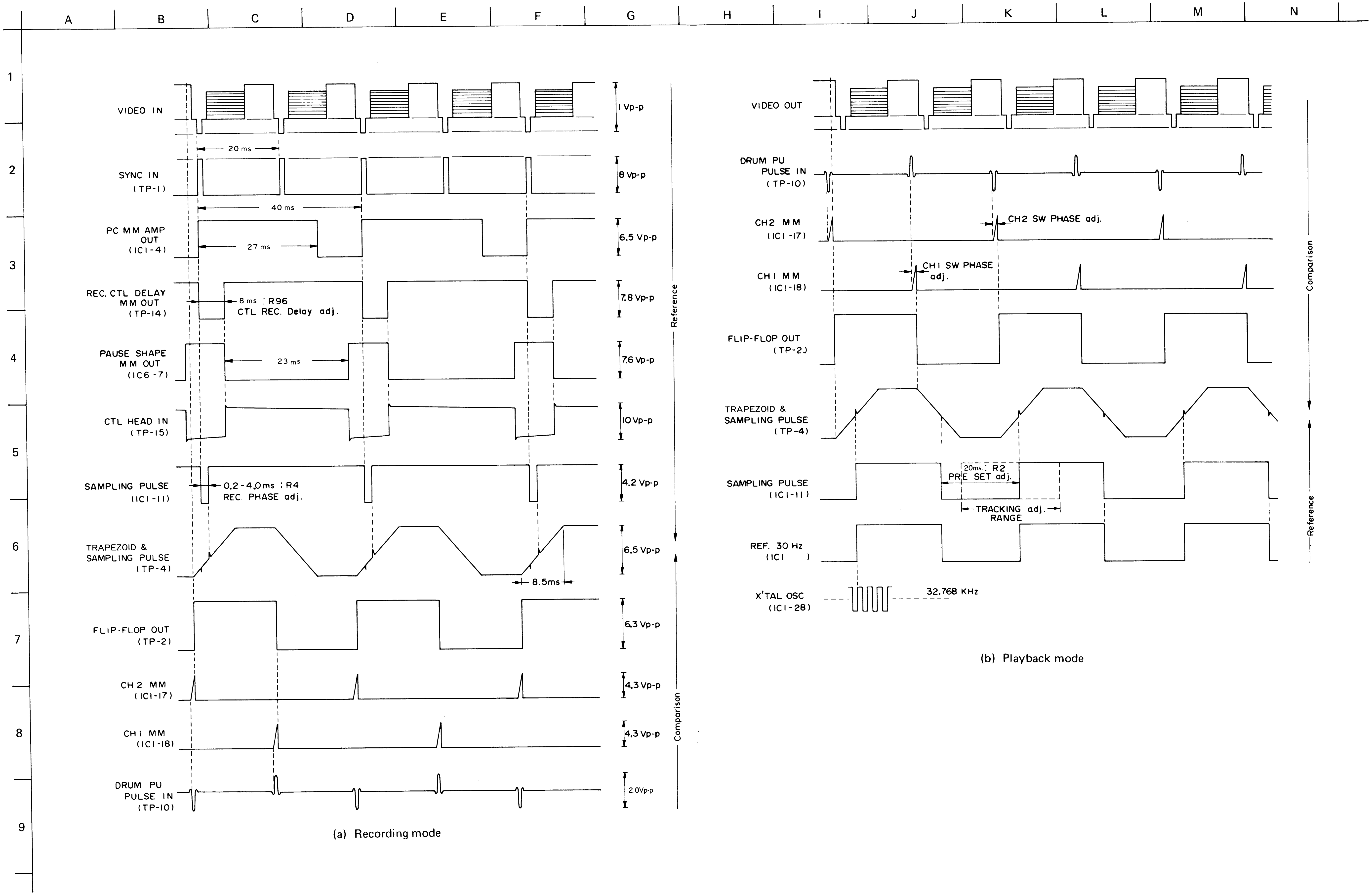
9
TP-10 (D. PU. H)
PULSE AMP
MONO MULTI
F.F
TRAPEZOID GEN
D. PULSE LEVEL
CH-1 SW PHASE
CH-2 SW PHASE
TP-7 (D. FG)
IC-3
PULSE GEN
SAMPLING PULSE
SAWTOOTH
RESET PULSE
DRUM FREE RUN
HOLD
AMP
E·F
SAMPLING & HOLD
SAMPLING PULSE GEN
SW POINT
PRESET
TRACKING
TP-4 (D.S. POS)
TP-2 (FF)
E. SW
P.B
REC
FROM AUDIO & CPU REEL MOTOR CTL IN
IC-7
STOP
REW
FF
PLAY
IDLER
UNLOAD
FWD SCAN
TP-6 (D. FREE RUN)
REV/SCAN
FWD SCAN
TP-8 (DM+)
(DM-) TP-9
1500 Hz
D. FG
DRUM MOTOR
MDA
D. PU. HEAD
D. MOTOR CTL IN (STOP REW/FF Ⓗ)
IC-9 SAW TOOTH GEN
TP-20
IC-10
IC-8
TP-21
TP-17
(UL)
(IDLER)
(PLAY)
FF/REW
TP-19
REEL MOTOR
SAMPLING PULSE
IC-5
RESET PULSE
E·SW
TUNER CONN
LINE
VIDEO IN
TP-1
AGC
E.E AMP
E.E LEVEL
TP-6 (SYNC OUT)
SYNC SEP
STOP REC
RECT
VIDEO AMP
08 Y. AMP
1. VIDEO IN/OUT
2. GND
CAMERA CONN.
TP-1 (SYNC)
L.P.F
V. SYNC SEP
MONO MULTI
(1/2)
TP-13 (C.P DELAY)
P.B CTL AMP
IC-6
TP-12 (CTL-2)
TP 11 (CTL-1)
P.B CTL DELAY
TP-14 (C.R DELAY)
REC AMP
REC CTL DELAY
CTL HEAD
IC-13
COUNT DOWN (1/5)
TP-22 (C.FG)
C.FREE RUN
C.S POS
TP-5
X'TAL
32 KHz OSC
COUNT DOWN (1/1310)
TRAPE ZOID
IC-14
IC-15
C. MOTOR CTL IN (STOP, FF, REW, STILL/F.ADV, SLOW Ⓗ)
(STILL/F.ADV, SLOW 9V)
TP-23 (C. FREE RUN)
TP-24 (CM)
CAP FG
126 Hz
CAP MOTOR
NORMAL Ⓗ
STILL
FADV
SLOW
(STOP, FF, REW, PLAY, REV/FWD, ADUB/ADUB, PAUSE) Ⓗ
REC 12V
IC-11
CTL PULSE IN
FF IN
REMOTE SLOW IN
REMOTE IN
PAUSE IN
SLOW IN
AL IN
PLAY IN
M.M (4)
M.M (5)
SPEED IN
F.F (2) OUT
STILL OUT
SLOW OUT
FROM MECHA CON
SLOW IN
(SLOW ONLY Ⓗ)
AL & STILL IN
(STILL ONLY Ⓗ)
ONE FRAME ADV IN
(F.ADV Ⓗ)
SLOW VR
AL SW
CTL SIG DET
IC-12
MONO MULTI-10
SLOW TRACK PRE SET
TP-27 (V. PULSE)
V. PULSE OUT

8-9. DRUM SERVO TIMING CHART (EG/EK/S)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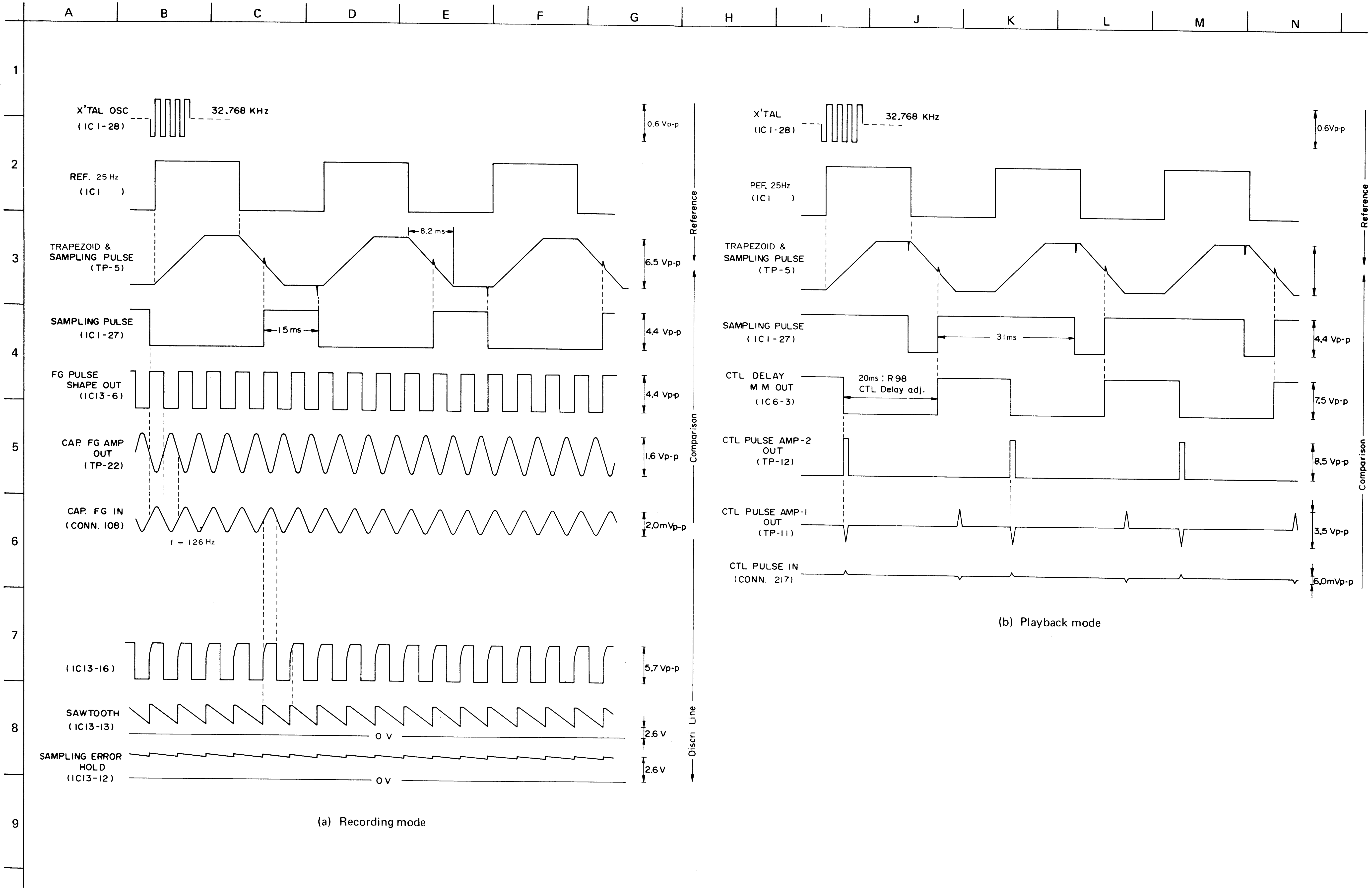
7
8
9
VIDEO IN
1 Vp-p
20 ms
SYNC IN (TP-1)
8 Vp-p
40 ms
PC MM AMP OUT (IC1-4)
27 ms
6.5 Vp-p
REC. CTL DELAY MM OUT (TP-14)
8 ms : R96 CTL REC. Delay adj.
7.8 Vp-p
PAUSE SHAPE MM OUT (IC6-7)
23 ms
7.6 Vp-p
CTL HEAD IN (TP-15)
10 Vp-p
SAMPLING PULSE (IC1-11)
0.2-4.0ms : R4 REC. PHASE adj.
4.2 Vp-p
TRAPEZOID & SAMPLING PULSE (TP-4)
8.5ms
6.5 Vp-p
FLIP-FLOP OUT (TP-2)
6.3 Vp-p
CH 2 MM (IC1-17)
4.3 Vp-p
CH 1 MM (IC1-18)
4.3 Vp-p
DRUM PU PULSE IN (TP-10)
2.0Vp-p
Reference
Comparison
VIDEO OUT
DRUM PU PULSE IN (TP-10)
CH2 MM (IC1-17)
CH2 SW PHASE adj.
CH1 MM (IC1-18)
CH1 SW PHASE adj.
FLIP-FLOP OUT (TP-2)
TRAPEZOID & SAMPLING PULSE (TP-4)
SAMPLING PULSE (IC1-11)
20ms : R2 PRE SET adj.
TRACKING adj. RANGE
REF. 30 Hz (IC1)
X'TAL OSC (IC1-28)
32.768 KHz
Comparison
Reference

(a) Recording mode

(b) Playback mode

8-10. CAPSTAN SERVO TIMING CHART (EG/EK/S)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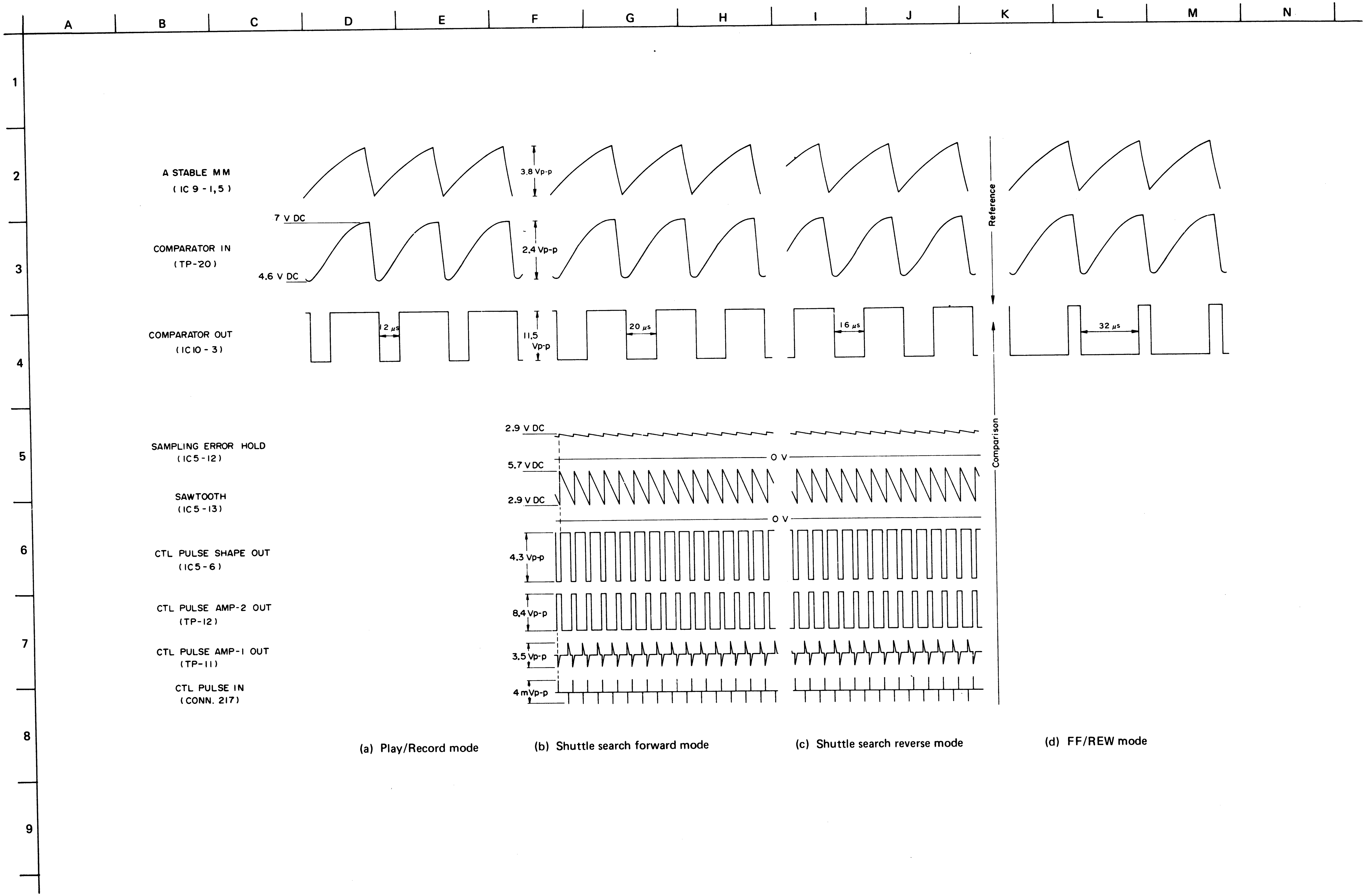
7
8
9
X'TAL OSC
(IC I-28)
32,768 KHz
0.6 Vp-p
REF. 25 Hz
(ICI)
TRAPEZOID &
SAMPLING PULSE
(TP-5)
8.2 ms
6.5 Vp-p
SAMPLING PULSE
(IC I-27)
15 ms
4.4 Vp-p
FG PULSE
SHAPE OUT
(IC13-6)
4.4 Vp-p
CAP. FG AMP
OUT
(TP-22)
1.6 Vp-p
CAP. FG IN
(CONN. 108)
f = 126 Hz
2.0mVp-p
(IC13-16)
5.7 Vp-p
SAWTOOTH
(IC13-13)
0 V
2.6 V
SAMPLING ERROR
HOLD
(IC13-12)
0 V
2.6 V
Reference
Comparison
Discri Line
X'TAL
(IC I-28)
32,768 KHz
0.6Vp-p
PEF. 25Hz
(ICI)
TRAPEZOID &
SAMPLING PULSE
(TP-5)
SAMPLING PULSE
(IC I-27)
31ms
4.4 Vp-p
CTL DELAY
M M OUT
(IC6-3)
20ms : R98
CTL Delay adj.
7.5 Vp-p
CTL PULSE AMP-2
OUT
(TP-12)
8.5 Vp-p
CTL PULSE AMP-1
OUT
(TP-11)
3.5 Vp-p
CTL PULSE IN
(CONN. 217)
6.0mVp-p
Reference
Comparison

(a) Recording mode

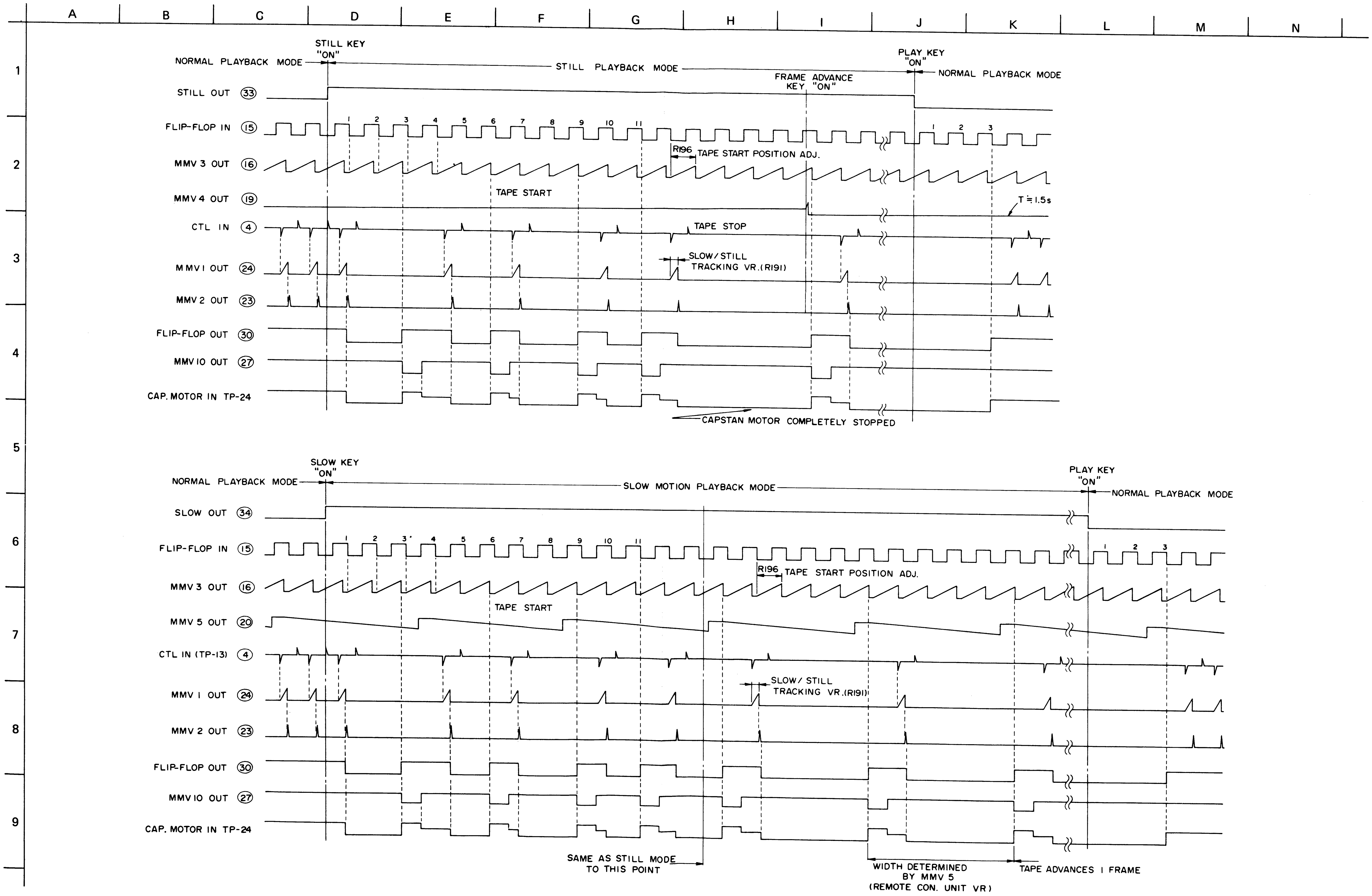
(b) Playback mode

8-11. REEL SERVO TIMING CHART (EG/EK/S)



(a) Play/Record mode (b) Shuttle search forward mode (c) Shuttle search reverse mode (d) FF/REW mode

8-12. SLOW/STILL TIMING CHART (EG/EK/S)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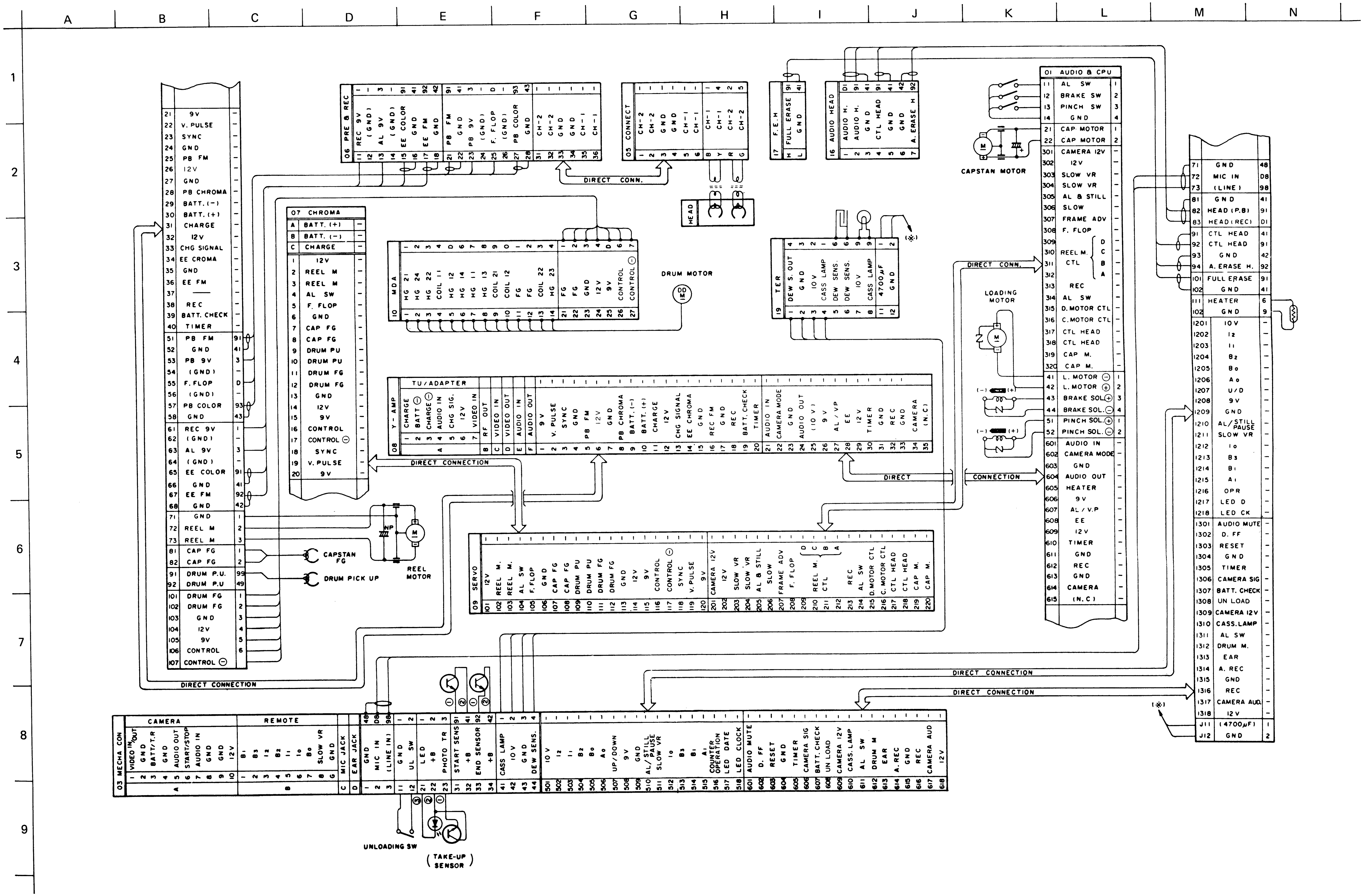
7
8
9
STILL KEY "ON"
NORMAL PLAYBACK MODE
STILL PLAYBACK MODE
PLAY KEY "ON"
NORMAL PLAYBACK MODE
FRAME ADVANCE KEY "ON"
STILL OUT ㉝
FLIP-FLOP IN ⑮
MMV 3 OUT ⑯
R196 TAPE START POSITION ADJ.
MMV 4 OUT ⑲
TAPE START
T ≒ 1.5s
CTL IN ④
TAPE STOP
MMV 1 OUT ㉔
SLOW/STILL TRACKING VR.(R191)
MMV 2 OUT ㉓
FLIP-FLOP OUT ㉚
MMV 10 OUT ㉗
CAP. MOTOR IN TP-24
CAPSTAN MOTOR COMPLETELY STOPPED
SLOW KEY "ON"
NORMAL PLAYBACK MODE
SLOW MOTION PLAYBACK MODE
PLAY KEY "ON"
NORMAL PLAYBACK MODE
SLOW OUT ㉞
FLIP-FLOP IN ⑮
MMV 3 OUT ⑯
R196 TAPE START POSITION ADJ.
TAPE START
MMV 5 OUT ⑳
CTL IN (TP-13) ④
MMV 1 OUT ㉔
SLOW/ STILL TRACKING VR.(R191)
MMV 2 OUT ㉓
FLIP-FLOP OUT ㉚
MMV 10 OUT ㉗
CAP. MOTOR IN TP-24
SAME AS STILL MODE TO THIS POINT
WIDTH DETERMINED BY MMV 5 (REMOTE CON. UNIT VR)
TAPE ADVANCES 1 FRAME
1
2
3
4
5
6
7
8
9
10
11

8-13. OVERALL WIRING DIAGRAM (EG/EK)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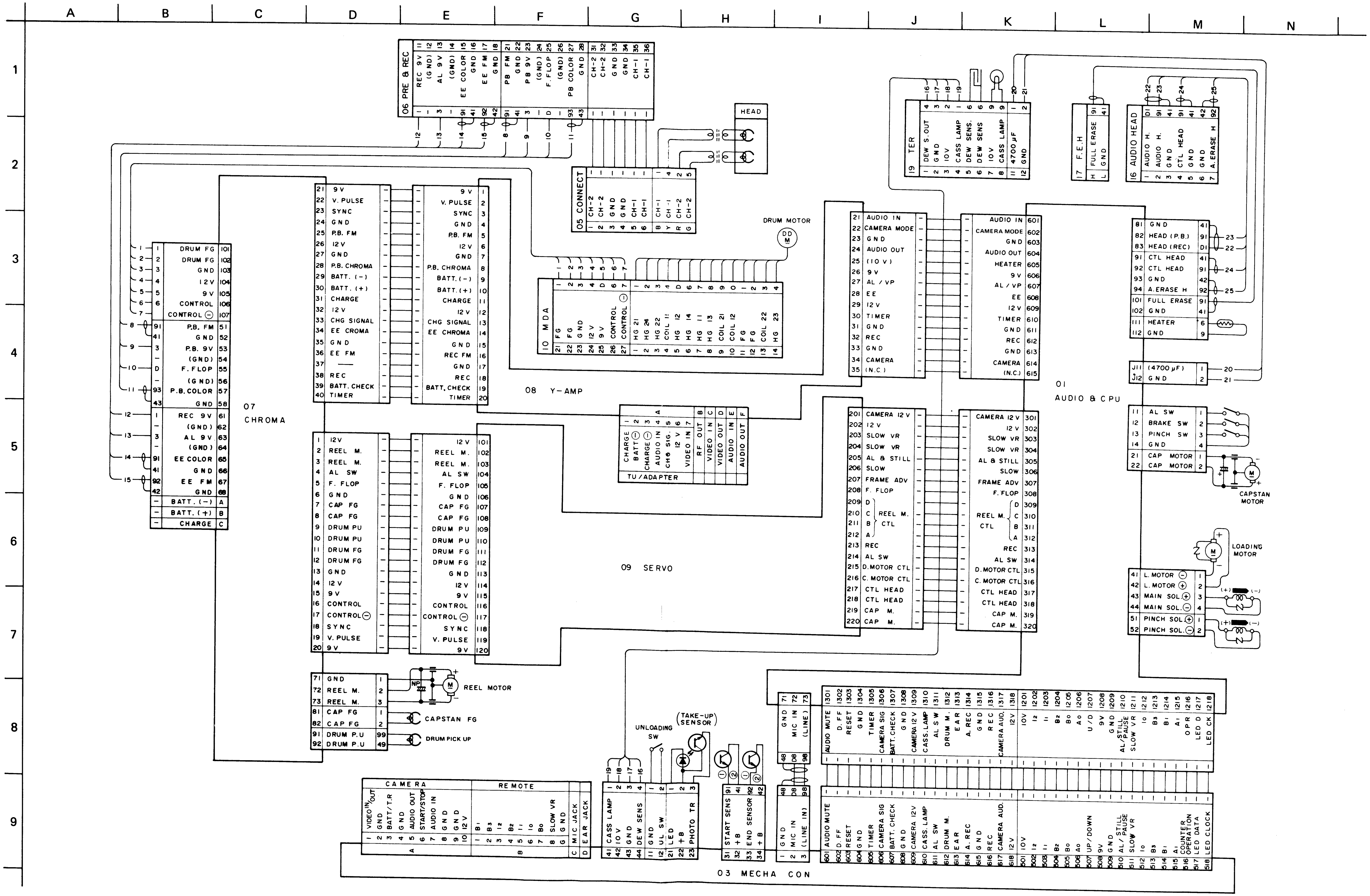
8
9
21 9V
22 V. PULSE
23 SYNC
24 GND
25 PB FM
26 12V
27 GND
28 PB CHROMA
29 BATT. (−)
30 BATT. (+)
31 CHARGE
32 12V
33 CHG SIGNAL
34 EE CROMA
35 GND
36 EE FM
38 REC
39 BATT. CHECK
40 TIMER
51 PB FM
52 GND
53 PB 9V
54 (GND)
55 F. FLOP
56 (GND)
57 PB COLOR
58 GND
61 REC 9V
62 (GND)
63 AL 9V
64 (GND)
65 EE COLOR
66 GND
67 EE FM
68 GND
71 GND
72 REEL M
73 REEL M
81 CAP FG
82 CAP FG
91 DRUM P.U.
92 DRUM P.U
101 DRUM FG
102 DRUM FG
103 GND
104 12V
105 9V
106 CONTROL
107 CONTROL ⊖
DIRECT CONNECTION
06 PRE & REC
REC 9V
(GND)
AL 9V
(GND)
EE COLOR
GND
EE FM
GND
PB FM
GND
PB 9V
(GND)
F. FLOP
(GND)
PB COLOR
GND
CH-2
CH-2
GND
GND
CH-1
CH-1
05 CONNECT
DIRECT CONN.
17 F.E.H
FULL ERASE
GND
16 AUDIO HEAD
AUDIO H.
AUDIO H.
GND
CTL HEAD
GND
GND
A. ERASE H
HEAD
07 CHROMA
BATT. (+)
BATT. (−)
CHARGE
12V
REEL M
REEL M
AL SW
F. FLOP
GND
CAP FG
CAP FG
DRUM PU
DRUM PU
DRUM FG
DRUM FG
GND
12V
9V
CONTROL
CONTROL ⊖
SYNC
V. PULSE
9V
10 MDA
HG 21
HG 24
HG 22
COIL 11
HG 12
HG 14
HG 11
HG 13
COIL 21
COIL 12
FG
FG
COIL 22
HG 23
FG
FG
GND
12V
9V
CONTROL
CONTROL ⊖
DRUM MOTOR
DD M
19 TER
DEW S. OUT
GND
10V
CASS LAMP
DEW SENS.
DEW SENS.
10V
CASS LAMP
4700μF
GND
(※)
08 Y-AMP
TU/ADAPTER
CHARGE
BATT ⊖
CHARGE ⊖
AUDIO IN
CHG SIG.
12V
VIDEO IN
RF OUT
VIDEO IN
VIDEO OUT
AUDIO IN
AUDIO OUT
9V
V. PULSE
SYNC
GND
PB FM
12V
GND
PB CHROMA
BATT. (−)
BATT. (+)
CHARGE
12V
CHG SIGNAL
EE CHROMA
REC FM
GND
REC
BATT. CHECK
TIMER
AUDIO IN
CAMERA MODE
GND
AUDIO OUT
(10V)
9V
AL/VP
EE
12V
TIMER
REC
GND
CAMERA
(N.C)
DIRECT CONNECTION
DIRECT
CONNECTION
DIRECT CONN.
01 AUDIO & CPU
11 AL SW
12 BRAKE SW
13 PINCH SW
14 GND
21 CAP MOTOR
22 CAP MOTOR
301 CAMERA 12V
302 12V
303 SLOW VR
304 SLOW VR
305 AL & STILL
306 SLOW
307 FRAME ADV
308 F. FLOP
309 D
310 REEL M. C
311 CTL B
312 A
313 REC
314 AL SW
315 D.MOTOR CTL
316 C.MOTOR CTL
317 CTL HEAD
318 CTL HEAD
319 CAP M.
320 CAP M.
41 L. MOTOR ⊖
42 L. MOTOR ⊕
43 BRAKE SOL.⊕
44 BRAKE SOL.⊖
51 PINCH SOL.⊕
52 PINCH SOL.⊖
601 AUDIO IN
602 CAMERA MODE
603 GND
604 AUDIO OUT
605 HEATER
606 9V
607 AL/V.P
608 EE
609 12V
610 TIMER
611 GND
612 REC
613 GND
614 CAMERA
615 (N.C)
CAPSTAN MOTOR
LOADING MOTOR
71 GND
72 MIC IN
73 (LINE)
81 GND
82 HEAD (P.B)
83 HEAD (REC)
91 CTL HEAD
92 CTL HEAD
93 GND
94 A. ERASE H.
101 FULL ERASE
102 GND
111 HEATER
112 GND
1201 10V
1202 I2
1203 I1
1204 B2
1205 B0
1206 A0
1207 U/D
1208 9V
1209 GND
1210 AL/STILL PAUSE
1211 SLOW VR
1212 I0
1213 B3
1214 B1
1215 A1
1216 OPR
1217 LED D
1218 LED CK
1301 AUDIO MUTE
1302 D. FF
1303 RESET
1304 GND
1305 TIMER
1306 CAMERA SIG
1307 BATT. CHECK
1308 UN LOAD
1309 CAMERA 12V
1310 CASS. LAMP
1311 AL SW
1312 DRUM M.
1313 EAR
1314 A. REC
1315 GND
1316 REC
1317 CAMERA AUD.
1318 12V
J11 (4700μF)
J12 GND
(※)
CAPSTAN FG
DRUM PICK UP
REEL MOTOR
09 SERVO
12V
REEL M.
REEL M.
AL SW
F. FLOP
GND
CAP FG
CAP FG
DRUM PU
DRUM PU
DRUM FG
DRUM FG
GND
12V
9V
CONTROL
CONTROL ⊖
SYNC
V. PULSE
9V
CAMERA 12V
12V
SLOW VR
SLOW VR
AL & STILL
SLOW
FRAME ADV
F. FLOP
REEL M. D C B A
CTL
REC
AL SW
D. MOTOR CTL
C. MOTOR CTL
CTL HEAD
CTL HEAD
CAP M.
CAP M.
DIRECT CONNECTION
DIRECT CONNECTION
03 MECHA CON
CAMERA
VIDEO IN/OUT
GND
BATT/T.R
GND
AUDIO OUT
START/STOP
AUDIO IN
GND
GND
12V
REMOTE
B1
B3
I2
B2
I1
I0
B0
SLOW VR
GND
MIC JACK
EAR JACK
GND
MIC IN
(LINE IN)
GND
UL SW
LED
+B
PHOTO TR
START SENSOR
+B
END SENSOR
+B
CASS LAMP
10V
GND
DEW SENS.
10V
I2
I1
B2
B0
A0
UP/DOWN
9V
GND
AL/STILL PAUSE
SLOW VR
I0
B3
B1
A1
COUNTER OPERATION
LED DATE
LED CLOCK
AUDIO MUTE
D. FF
RESET
GND
TIMER
CAMERA SIG
BATT. CHECK
UN LOAD
CAMERA 12V
CASS. LAMP
AL SW
DRUM M
EAR
A. REC
GND
REC
CAMERA AUD
12V
UNLOADING SW
(TAKE-UP SENSOR)

8-14. OVERALL WIRING DIAGRAM (S)


A
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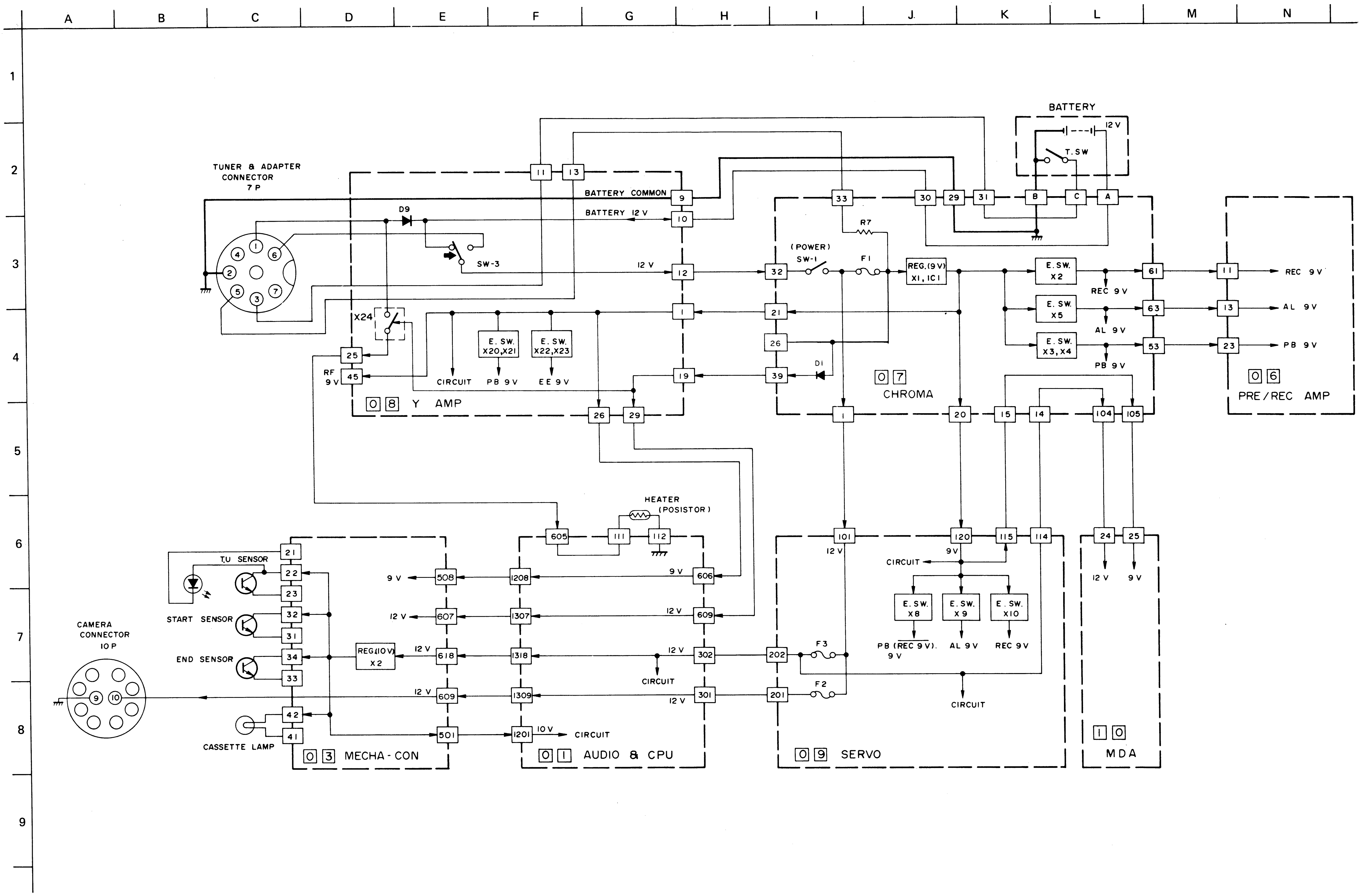
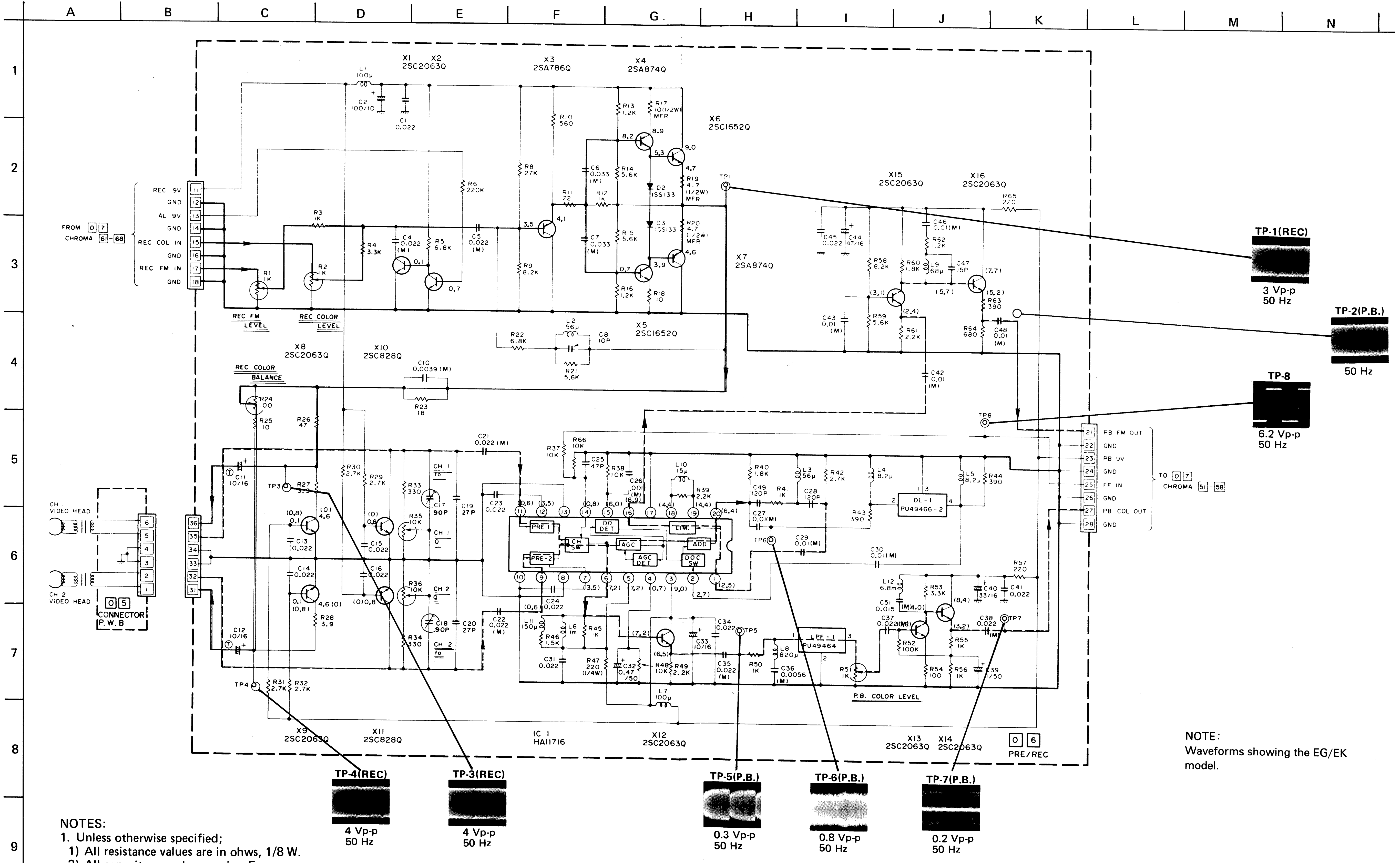
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
06 PRE & REC
HEAD
05 CONNECT
10 MDA
DRUM MOTOR
DD M
19 TER
17 F.E.H
16 AUDIO HEAD
07 CHROMA
08 Y-AMP
09 SERVO
TU/ADAPTER
01 AUDIO & CPU
CAPSTAN MOTOR
LOADING MOTOR
REEL MOTOR
CAPSTAN FG
DRUM PICK UP
UNLOADING SW
(TAKE-UP) SENSOR
CAMERA
REMOTE
MIC JACK
EAR JACK
03 MECHA CON
DRUM FG
P.B. FM
P.B. COLOR
REC 9V
AL 9V
EE COLOR
EE FM
BATT. (-)
BATT. (+)
CHARGE
9 V
V. PULSE
SYNC
GND
P.B. CHROMA
12 V
CHG SIGNAL
EE CHROMA
REC FM
REC
BATT. CHECK
TIMER
REEL M.
AL SW
F. FLOP
CAP FG
DRUM PU
CONTROL
CONTROL ⊖
AUDIO IN
CAMERA MODE
AUDIO OUT
HEATER
AL / VP
EE
CAMERA
CAMERA 12 V
SLOW VR
AL & STILL
SLOW
FRAME ADV
REEL M. CTL
D.MOTOR CTL
C.MOTOR CTL
CTL HEAD
CAP M.
HEAD (P.B.)
HEAD (REC)
A.ERASE H
FULL ERASE
(4700 μF)
BRAKE SW
PINCH SW
CAP MOTOR
L. MOTOR ⊖
L. MOTOR ⊕
MAIN SOL.⊕
MAIN SOL.⊖
PINCH SOL.⊕
PINCH SOL.⊖
DEW S.OUT
CASS LAMP
DEW SENS
10 V
4700 μF
AUDIO H.
CTL HEAD
CH-1
CH-2
HG
COIL
FG
CHG SIG.
RF OUT
VIDEO IN
VIDEO OUT
AUDIO MUTE
D.FF
RESET
CAMERA SIG
MIC IN
(LINE IN)
UP/DOWN
AL/STILL PAUSE
COUNTER OPERATION
LED DATA
LED CLOCK
START SENS
END SENSOR
UL SW
LED
PHOTO TR
VIDEO IN/OUT
BATT/T.R
START/STOP

8-15. DC LINE WIRING DIAGRAM (EG/EK/S)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
BATTERY
12 V
T. SW
B
C
A
TUNER & ADAPTER CONNECTOR 7 P
BATTERY COMMON
BATTERY 12 V
D9
SW-3
12 V
X24
RF 9 V
25
45
E. SW. X20, X21
E. SW. X22, X23
CIRCUIT
PB 9 V
EE 9 V
08 Y AMP
11
13
9
10
12
1
19
26
29
33
30
29
31
R7
(POWER) SW-1
F1
REG. (9 V) X1, IC1
32
21
26
39
D1
07 CHROMA
E. SW. X2
REC 9 V
E. SW. X5
AL 9 V
E. SW. X3, X4
PB 9 V
61
63
53
1
20
15
14
104
105
11
13
23
REC 9 V
AL 9 V
PB 9 V
06 PRE / REC AMP
HEATER (POSISTOR)
605
111
112
T.U SENSOR
START SENSOR
END SENSOR
CAMERA CONNECTOR 10 P
CASSETTE LAMP
21
22
23
32
31
34
33
42
41
REG. (10 V) X2
9 V
12 V
12 V
12 V
508
607
618
609
501
03 MECHA - CON
1208
1307
1318
1309
1201
10 V
CIRCUIT
606
609
302
301
9 V
12 V
12 V
12 V
CIRCUIT
01 AUDIO & CPU
101
120
115
114
12 V
9 V
CIRCUIT
E. SW. X8
E. SW. X9
E. SW. X10
PB (REC 9 V). 9 V
AL 9 V
REC 9 V
202
201
F3
F2
CIRCUIT
09 SERVO
24
25
12 V
9 V
10 MDA

8-16. PRE/RECORD CIRCUIT SCHEMATIC DIAGRAM (EG/EK/S)

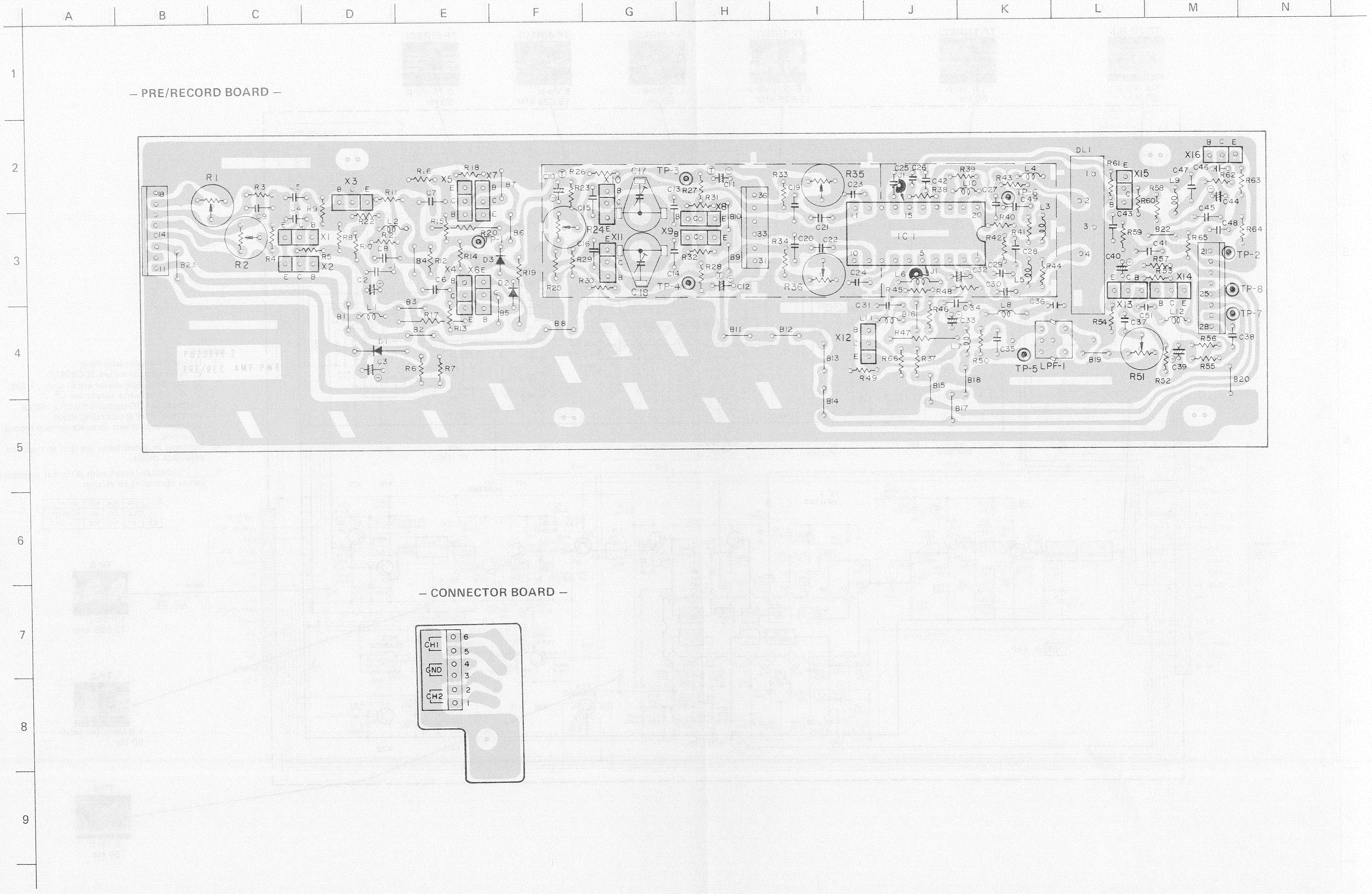


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
X1 X2 2SC2063Q
X3 2SA786Q
X4 2SA874Q
X6 2SC1652Q
X7 2SA874Q
X5 2SC1652Q
X8 2SC2063Q
X10 2SC828Q
X15 2SC2063Q
X16 2SC2063Q
X9 2SC2063Q
X11 2SC828Q
IC 1 HA11716
X12 2SC2063Q
X13 X14 2SC2063Q 2SC2063Q
FROM 07 CHROMA 61-68
REC 9V
GND
AL 9V
GND
REC COL IN
GND
REC FM IN
GND
REC FM LEVEL
REC COLOR LEVEL
REC COLOR BALANCE
CH 1 VIDEO HEAD
CH 2 VIDEO HEAD
05 CONNECTOR P.W.B
PB FM OUT
GND
PB 9V
GND
FF IN
GND
PB COL OUT
GND
TO 07 CHROMA 51-58
PRE 1
PRE-2
CH SW
DO DET
AGC
AGC DET
LIM.
ADD
DOC SW
DL-1 PU49466-2
LPF-1 PU49464
P.B. COLOR LEVEL
16 PRE/REC
TP1
TP3
TP4
TP5
TP6
TP7
TP8
TP-1(REC)
3 Vp-p 50 Hz
TP-2(P.B.)
50 Hz
TP-8
6.2 Vp-p 50 Hz
TP-4(REC)
4 Vp-p 50 Hz
TP-3(REC)
4 Vp-p 50 Hz
TP-5(P.B.)
0.3 Vp-p 50 Hz
TP-6(P.B.)
0.8 Vp-p 50 Hz
TP-7(P.B.)
0.2 Vp-p 50 Hz

NOTE:
Waveforms showing the EG/EK model.

NOTES:
1. Unless otherwise specified;
   1) All resistance values are in ohws, 1/8 W.
   2) All capacitance values are in μF.
2. Voltages are DC-measured with a digital voltmeter during recording mode.
3. Where voltage differs between recording and playback, the voltage duirng playback is shown in parentheses.

8-17. PRE/RECORD AND CONNECTOR CIRCUIT BOARDS (EG/EK/S)

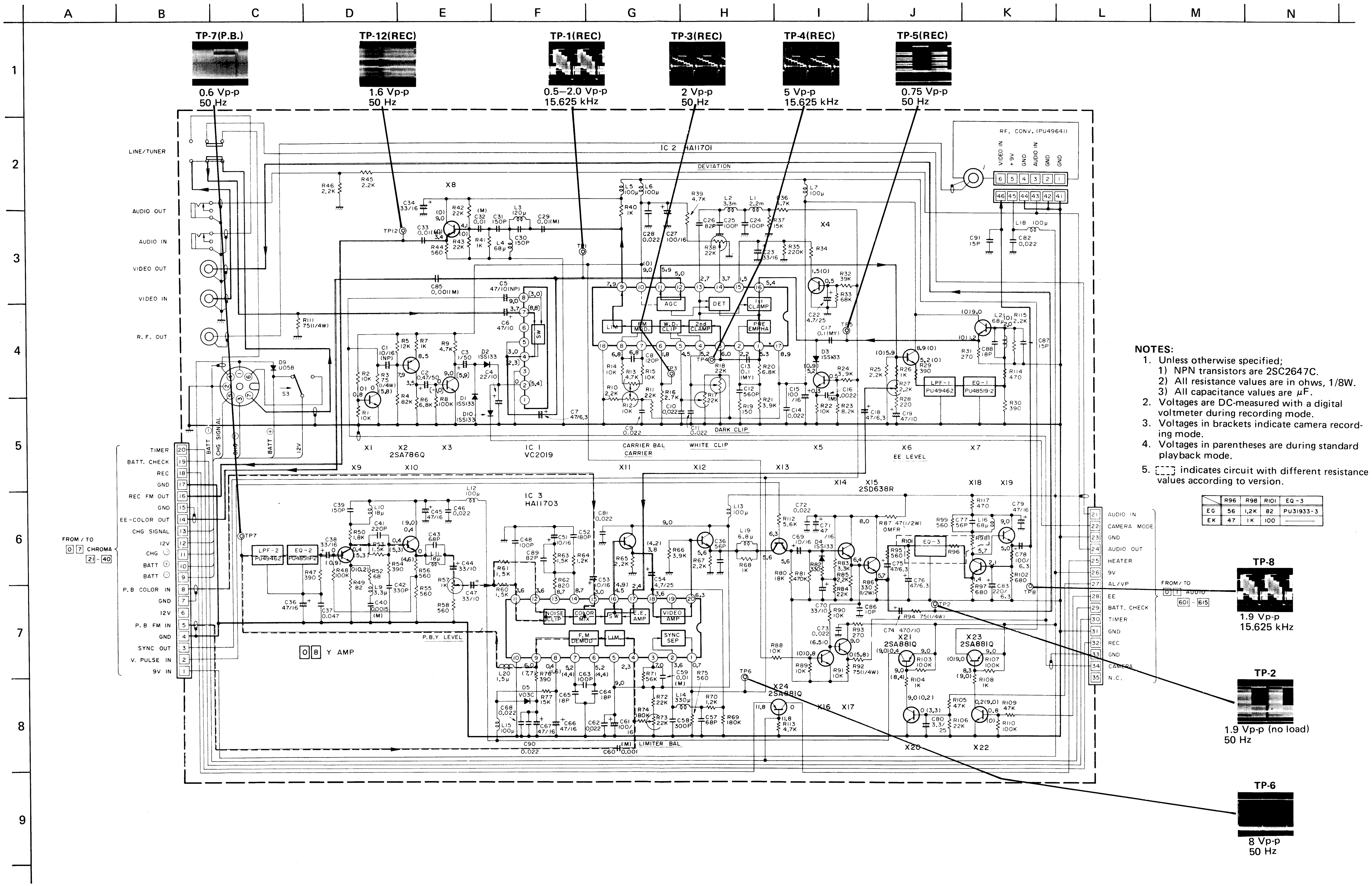


– PRE/RECORD BOARD –

– CONNECTOR BOARD –

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
R1
R2
R3
R4
R5
R6
R7
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
X15
X16
IC1
TP-1
TP-2
TP-3
TP-4
TP-5
TP-6
TP-7
TP-8
LPF-1
DL1
D1
D2
D3
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
L11
L12
J1
R35
R36
R51
C17
C18
B23
B20
PW20938 2
PRE/REC AMP PWB
CH1
GND
CH2
6
5
4
3
2
1

8-18. LUMINANCE (Y) CIRCUIT SCHEMATIC DIAGRAM (EG/EK)

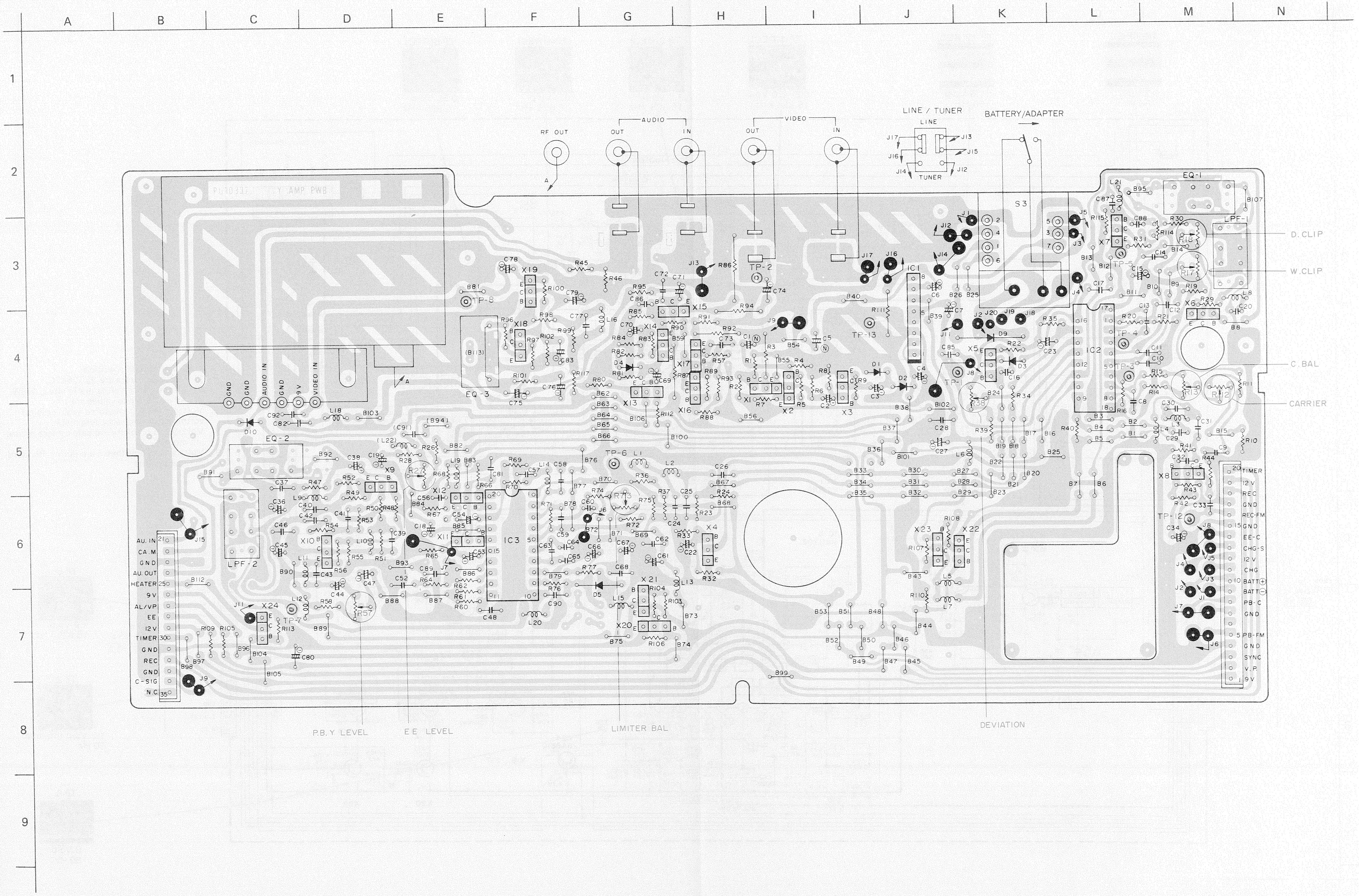

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
TP-7(P.B.)
0.6 Vp-p
50 Hz
TP-12(REC)
1.6 Vp-p
50 Hz
TP-1(REC)
0.5–2.0 Vp-p
15.625 kHz
TP-3(REC)
2 Vp-p
50 Hz
TP-4(REC)
5 Vp-p
15.625 kHz
TP-5(REC)
0.75 Vp-p
50 Hz
LINE/TUNER
AUDIO OUT
AUDIO IN
VIDEO OUT
VIDEO IN
R. F. OUT
IC 2 HA11701
DEVIATION
RF. CONV. (PU49641)
VIDEO IN
+9V
GND
AUDIO IN
GND
GND
AGC
DET
CLAMP
LIM
FM MOD.
W.D. CLIP
2nd CLAMP
PRE EMPHA
DARK CLIP
CARRIER BAL
WHITE CLIP
CARRIER
EE LEVEL
X1
X2
2SA786Q
X3
IC 1
VC2019
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
X15
2SD638R
X18
X19
LPF-1
PU49462
EQ-1
PU48519-2
TIMER
BATT. CHECK
REC
GND
REC FM OUT
GND
EE-COLOR OUT
CHG SIGNAL
12V
CHG
BATT ⊕
BATT ⊖
P.B COLOR IN
GND
12V
P.B FM IN
GND
SYNC OUT
V. PULSE IN
9V IN
FROM / TO
07 CHROMA
21 - 40
BATT
CHG SIGNAL
BATT ⊕
12V
S3
LPF-2
PU49462
EQ-2
PU48519-2
08 Y AMP
P.B.Y LEVEL
IC 3
HA11703
NOISE CLIP
COLOR MIX
SW
E.E. AMP
VIDEO AMP
SYNC SEP
F.M DEMOD
LIM
LIMITER BAL
EQ-3
X20
X21
2SA881Q
X22
X23
2SA881Q
X24
2SA881Q
X16
X17
TP6
TP2
TP7
TP8
AUDIO IN
CAMERA MODE
GND
AUDIO OUT
HEATER
9V
AL/VP
EE
BATT. CHECK
TIMER
GND
REC
GND
CAMERA
N.C.
FROM / TO
01 AUDIO
601 - 615
TP-8
1.9 Vp-p
15.625 kHz
TP-2
1.9 Vp-p (no load)
50 Hz
TP-6
8 Vp-p
50 Hz

NOTES:

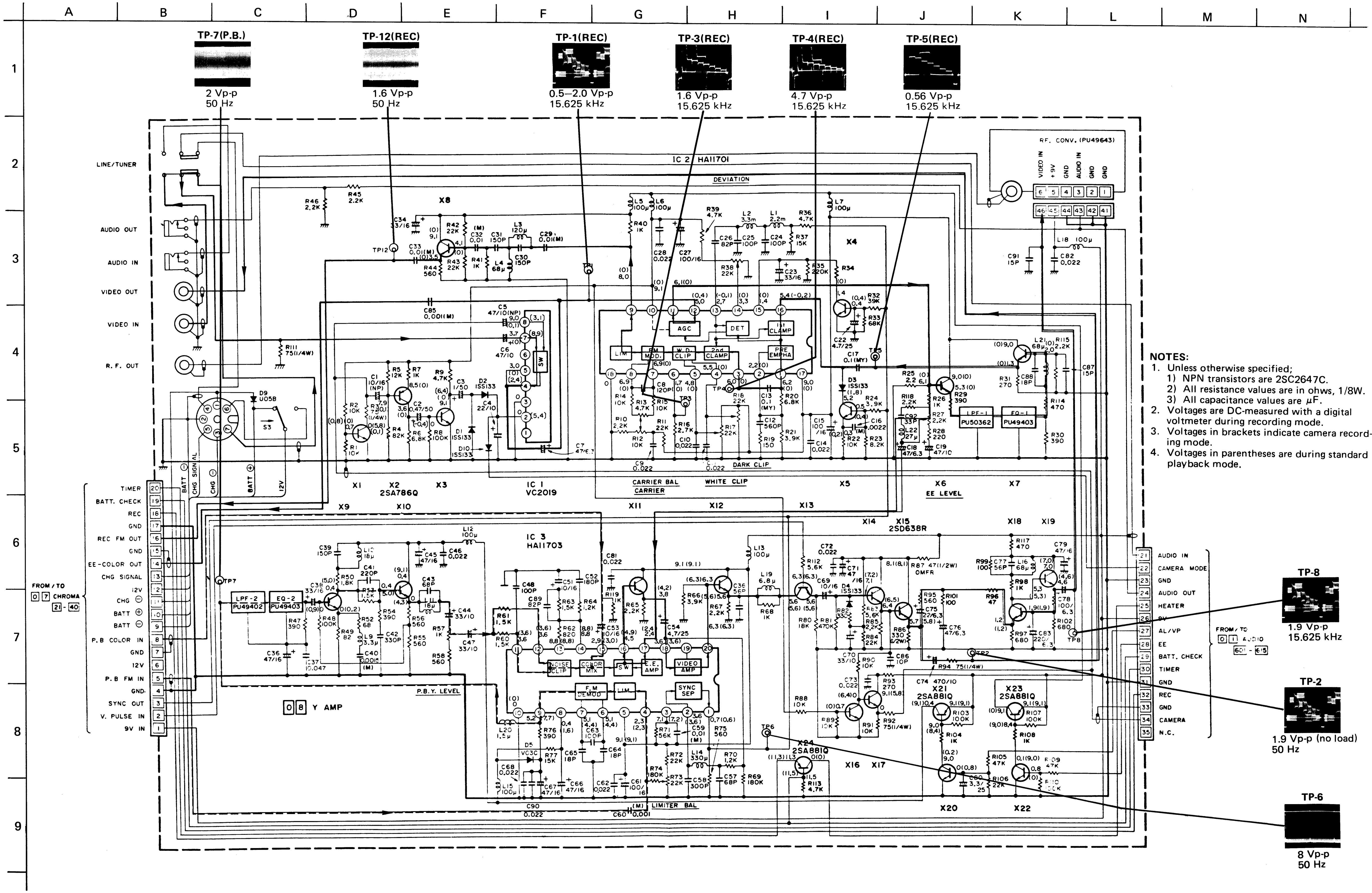
1. Unless otherwise specified;
   1) NPN transistors are 2SC2647C.
   2) All resistance values are in ohws, 1/8W.
   3) All capacitance values are μF.
2. Voltages are DC-measured with a digital voltmeter during recording mode.
3. Voltages in brackets indicate camera recording mode.
4. Voltages in parentheses are during standard playback mode.
5. [ ] indicates circuit with different resistance values according to version.

	R96	R98	R101	EQ-3
EG	56	1.2K	82	PU31933-3
EK	47	1K	100	———

8-19. LUMINANCE (Y) CIRCUIT BOARD (EG/EK)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
RF OUT
AUDIO
OUT
IN
VIDEO
OUT
IN
LINE / TUNER
LINE
TUNER
BATTERY/ADAPTER
S3
EQ-1
EQ-2
EQ-3
LPF-1
LPF-2
IC1
IC2
IC3
TP-1
TP-2
TP-3
TP-4
TP-5
TP-6
TP-7
TP-8
TP-12
TP-13
GND
GND
AUDIO IN
GND
9V
VIDEO IN
AU. IN
CA.M
GND
AU. OUT
HEATER
9V
AL/VP
EE
12V
TIMER
GND
REC
GND
C-SIG
N.C.
TIMER
12V
REC
GND
REC-FM
GND
EE-C
CHG-S
12V
CHG
BATT⊕
BATT⊖
PB-C
GND
PB-FM
GND
SYNC
V.P.
9V
D. CLIP
W. CLIP
C. BAL
CARRIER
P.B. Y LEVEL
E.E. LEVEL
LIMITER BAL
DEVIATION

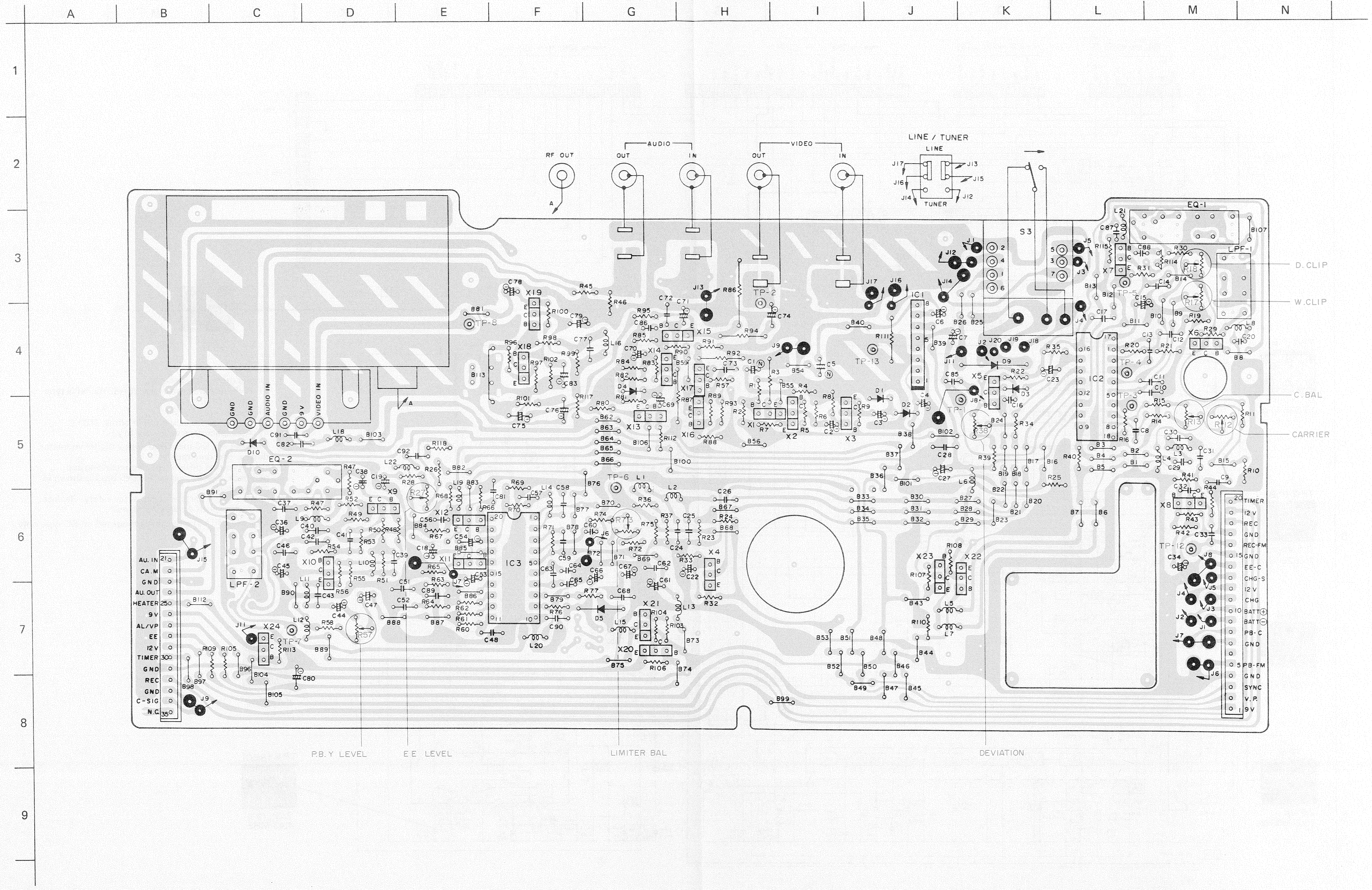
8-20. LUMINANCE (Y) CIRCUIT SCHEMATIC DIAGRAM (S)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
TP-7(P.B.)
2 Vp-p
50 Hz
TP-12(REC)
1.6 Vp-p
50 Hz
TP-1(REC)
0.5–2.0 Vp-p
15.625 kHz
TP-3(REC)
1.6 Vp-p
15.625 kHz
TP-4(REC)
4.7 Vp-p
15.625 kHz
TP-5(REC)
0.56 Vp-p
15.625 kHz
IC 2 HA11701
DEVIATION
RF. CONV. (PU49643)
VIDEO IN
+9V
GND
AUDIO IN
GND
GND
LINE/TUNER
AUDIO OUT
AUDIO IN
VIDEO OUT
VIDEO IN
R. F. OUT
AGC
DET
CLAMP
LIM
FM MOD.
W.D. CLIP
CLAMP
PRE EMPHA
SW
X1
X2
2SA786Q
X3
IC 1
VC2019
CARRIER BAL
CARRIER
WHITE CLIP
DARK CLIP
X5
X6
EE LEVEL
X7
X9
X10
X11
X12
X13
X14
X15
2SD638R
X18
X19
LPF-1
PU50362
EQ-1
PU49403
TIMER
BATT. CHECK
REC
GND
REC FM OUT
GND
EE-COLOR OUT
CHG SIGNAL
12V
CHG ⊖
BATT ⊕
BATT ⊖
P.B COLOR IN
GND
12V
P.B FM IN
GND
SYNC OUT
V. PULSE IN
9V IN
FROM/TO
07 CHROMA
21 - 40
BATT ⊖
CHG SIGNAL
CHG ⊖
BATT ⊕
12V
IC 3
HA11703
LPF-2
PU49402
EQ-2
PU49403
NOISE CLIP
COLOR MIX
SW
E.E. AMP
VIDEO AMP
F.M DEMOD
LIM
SYNC SEP
P.B.Y. LEVEL
08 Y AMP
LIMITER BAL
X16
X17
X20
X21
2SA881Q
X22
X23
2SA881Q
X24
2SA881Q
TP6
TP7
TP8
TP2
AUDIO IN
CAMERA MODE
GND
AUDIO OUT
HEATER
9V
AL/VP
EE
BATT. CHECK
TIMER
GND
REC
GND
CAMERA
N.C.
FROM/TO
01 AUDIO
60 - 65
TP-8
1.9 Vp-p
15.625 kHz
TP-2
1.9 Vp-p (no load)
50 Hz
TP-6
8 Vp-p
50 Hz

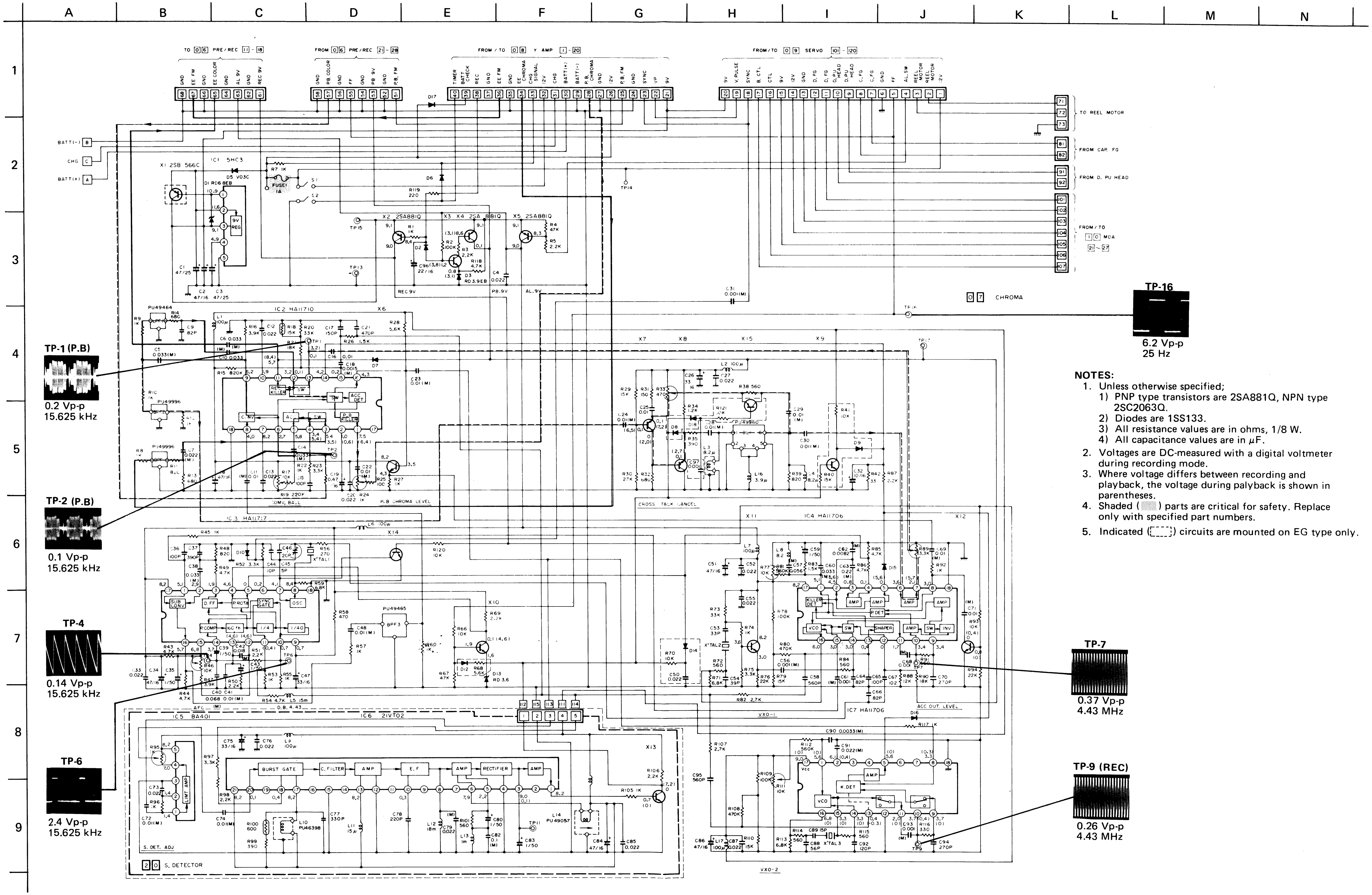
NOTES:

1. Unless otherwise specified;
   1) NPN transistors are 2SC2647C.
   2) All resistance values are in ohws, 1/8W.
   3) All capacitance values are μF.
2. Voltages are DC-measured with a digital voltmeter during recording mode.
3. Voltages in brackets indicate camera recording mode.
4. Voltages in parentheses are during standard playback mode.

8-21. LUMINANCE (Y) CIRCUIT BOARD (S)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
RF OUT
AUDIO
OUT
IN
VIDEO
OUT
IN
LINE / TUNER
LINE
TUNER
J17
J13
J16
J15
J14
J12
S3
EQ-1
LPF-1
D. CLIP
W. CLIP
C. BAL
CARRIER
EQ-2
LPF-2
IC1
IC2
IC3
GND
GND
AUDIO IN
GND
9V
VIDEO IN
AU. IN
CA. M
GND
AU. OUT
HEATER
9V
AL/VP
EE
12V
TIMER
GND
REC
GND
C-SIG
N.C.
TIMER
12V
REC
GND
REC-FM
GND
EE-C
CHG-S
12V
CHG
BATT⊕
BATT⊖
PB-C
GND
PB-FM
GND
SYNC
V.P.
9V
TP-1
TP-2
TP-3
TP-4
TP-5
TP-6
TP-7
TP-8
TP-12
TP-13
P.B. Y LEVEL
E.E LEVEL
LIMITER BAL
DEVIATION

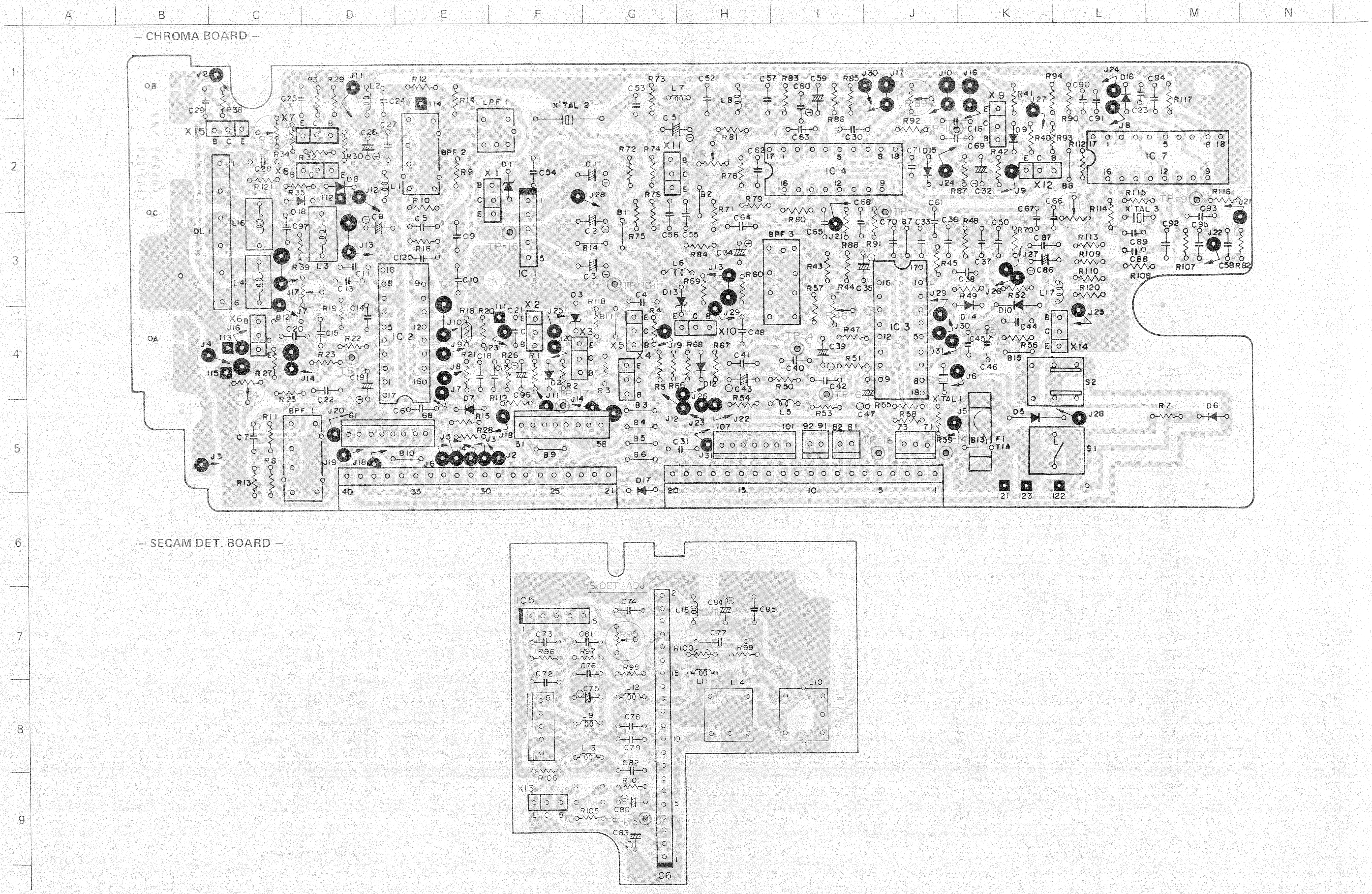
8-22. CHROMINANCE (CHROMA) AND SECAM DET. CIRCUITS SCHEMATIC DIAGRAM (EG/EK)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
TO 06 PRE/REC 11 - 18
FROM 06 PRE/REC 21 - 28
FROM/TO 08 Y AMP 1 - 20
FROM/TO 09 SERVO 101 - 120
TO REEL MOTOR
FROM CAP. FG
FROM D. PU HEAD
FROM/TO 10 MDA 21 ~ 27
07 CHROMA
BATT(-)
CHG
BATT(+)
X1 2SB 566C
IC1 5HC3
9V REG
X2 2SA881Q
X3 X4 2SA 881Q
X5 2SA881Q
IC2 HA11710
IC3 HA11717
IC4 HA11706
IC5 BA401
IC6 21VT02
IC7 HA11706
CROSS TALK CANCEL
P.B CHROMA LEVEL
ACC OUT. LEVEL
AFC
VXO-1
VXO-2
BURST GATE
C. FILTER
AMP
E. F
RECTIFIER
LIMIT AMP
S. DET. ADJ
20 S. DETECTOR
TP-1 (P.B)
0.2 Vp-p
15.625 kHz
TP-2 (P.B)
0.1 Vp-p
15.625 kHz
TP-4
0.14 Vp-p
15.625 kHz
TP-6
2.4 Vp-p
15.625 kHz
TP-16
6.2 Vp-p
25 Hz
TP-7
0.37 Vp-p
4.43 MHz
TP-9 (REC)
0.26 Vp-p
4.43 MHz

NOTES:

1. Unless otherwise specified;
   1) PNP type transistors are 2SA881Q, NPN type 2SC2063Q.
   2) Diodes are 1SS133.
   3) All resistance values are in ohms, 1/8 W.
   4) All capacitance values are in μF.
2. Voltages are DC-measured with a digital voltmeter during recording mode.
3. Where voltage differs between recording and playback, the voltage during palyback is shown in parentheses.
4. Shaded (▨) parts are critical for safety. Replace only with specified part numbers.
5. Indicated (⬚) circuits are mounted on EG type only.

8-23. CHROMINANCE (CHROMA) AND SECAM DET. CIRCUIT BOARDS (EG/EK)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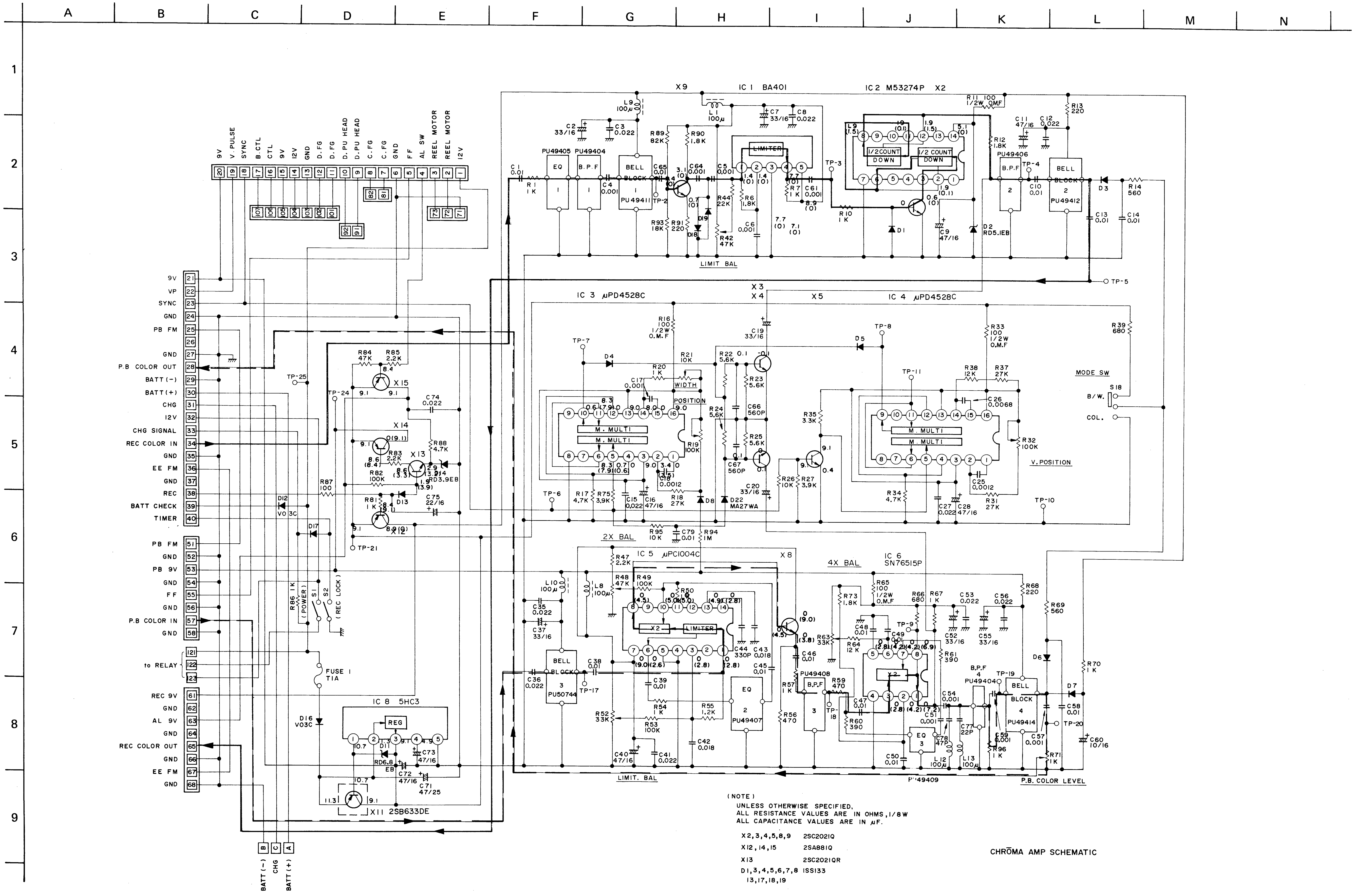
9
– CHROMA BOARD –
PU21060 CHROMA PWB
IC 1
IC 2
IC 3
IC 4
IC 7
X'TAL 1
X'TAL 2
X'TAL 3
BPF 1
BPF 2
BPF 3
LPF 1
DL 1
S1
S2
F1
T1A
TP-4
TP-6
TP-7
TP-9
TP-13
TP-15
TP-16
TP-17
– SECAM DET. BOARD –
S.DET. ADJ
IC5
IC6
X13
L10
L14
TP-11
PU32801 S.DETECTOR PWB

8-24. CHROMINANCE (CHROMA) SCHEMATIC DIAGRAM (S)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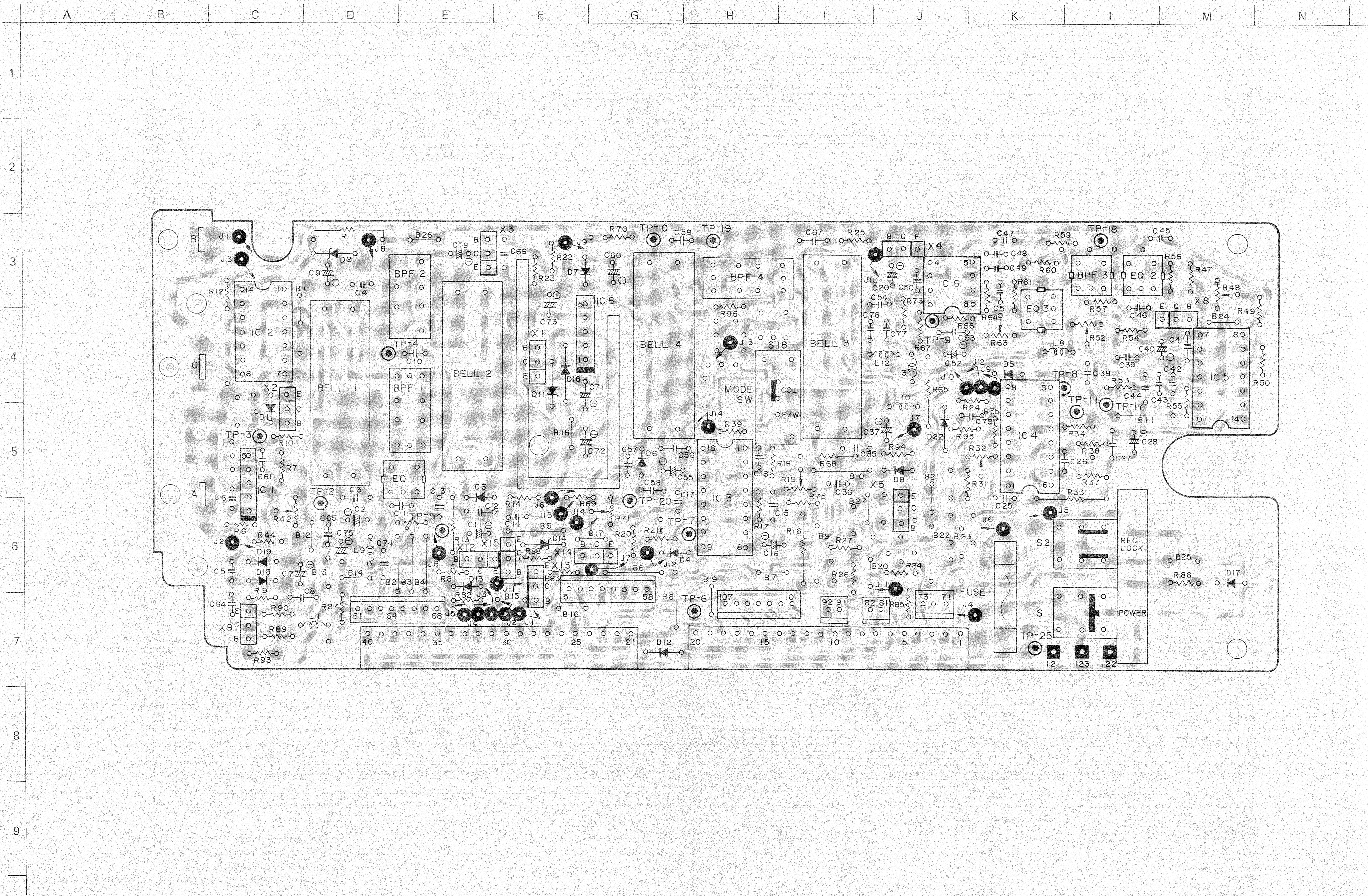
7
8
9
IC 1 BA401
IC 2 M53274P X2
X9
LIMITER
1/2 COUNT DOWN
BELL BLOCK
B.P.F
EQ
PU49405
PU49404
PU49411
PU49406
PU49412
LIMIT BAL
IC 3 μPD4528C
IC 4 μPD4528C
X3
X4
X5
M. MULTI
WIDTH
POSITION
MODE SW
S18
B/W.
COL.
V. POSITION
2X BAL
IC 5 μPC1004C
X8
IC 6 SN76515P
4X BAL
X2
PU50744
PU49407
PU49408
PU49409
PU49414
P.B. COLOR LEVEL
LIMIT. BAL
IC 8 5HC3
REG
X11 2SB633DE
X12
X13
X14
X15
FUSE 1 T1A
S1 (POWER)
S2 (REC LOCK)
to RELAY
9V
V. PULSE
SYNC
B. CTL
CTL
9V
12V
GND
D. FG
D. FG
D. PU HEAD
D. PU HEAD
C. FG
C. FG
GND
FF
AL SW
REEL MOTOR
REEL MOTOR
12V
9V
VP
SYNC
GND
PB FM
GND
P.B COLOR OUT
BATT (−)
BATT (+)
CHG
12V
CHG SIGNAL
REC COLOR IN
GND
EE FM
GND
REC
BATT CHECK
TIMER
PB FM
GND
PB 9V
GND
FF
GND
P.B COLOR IN
GND
REC 9V
GND
AL 9V
GND
REC COLOR OUT
GND
EE FM
GND
BATT (−)
CHG
BATT (+)
TP-1
TP-2
TP-3
TP-4
TP-5
TP-6
TP-7
TP-8
TP-9
TP-10
TP-11
TP-17
TP-18
TP-19
TP-20
TP-21
TP-24
TP-25

(NOTE)
UNLESS OTHERWISE SPECIFIED,
ALL RESISTANCE VALUES ARE IN OHMS, 1/8W
ALL CAPACITANCE VALUES ARE IN μF.

X2,3,4,5,8,9	2SC2021Q
X12,14,15	2SA881Q
X13	2SC2021QR
D1,3,4,5,6,7,8 13,17,18,19	1SS133

CHRŌMA AMP SCHEMATIC

8-25. CHROMINANCE (CHROMA) CIRCUIT BOARD (S)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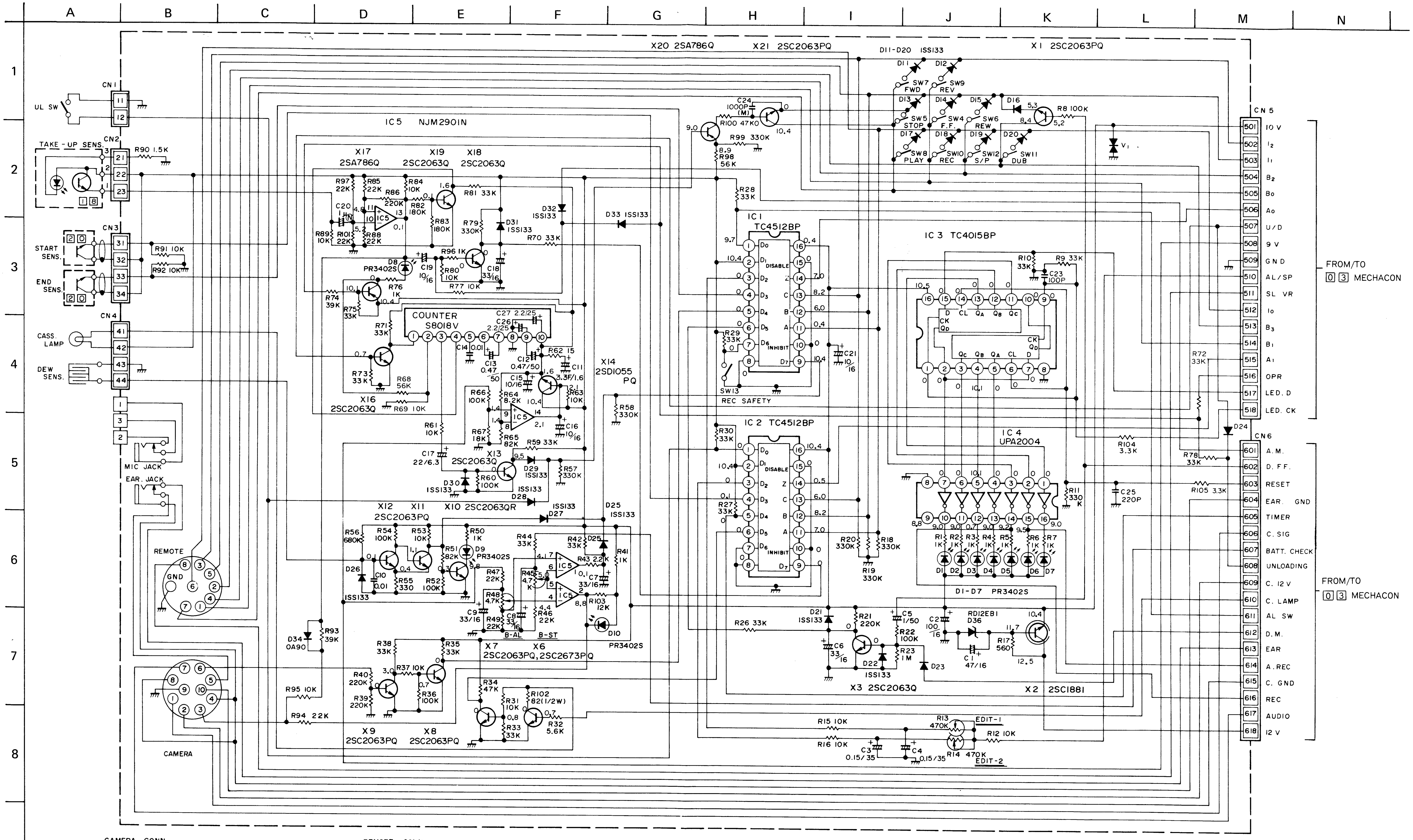
7
8
9
IC 1
IC 2
IC 3
IC 4
IC 5
IC 6
IC 8
BELL 1
BELL 2
BELL 3
BELL 4
BPF 1
BPF 2
BPF 3
BPF 4
EQ 1
EQ 2
EQ 3
X2
X3
X4
X5
X8
X9
X11
X12
X13
X14
X15
MODE SW
COL
B/W
S18
S1
S2
REC LOCK
POWER
FUSE 1
TP-2
TP-3
TP-4
TP-5
TP-6
TP-7
TP-8
TP-9
TP-10
TP-11
TP-17
TP-18
TP-19
TP-20
TP-25
J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11
J12
J13
J14
121
123
122
PU21241 CHROMA PWB

8-26. MECHANISM CONTROL (MECHACON) CIRCUIT SCHEMATIC DIAGRAM (EG/EK/S)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7
8
9
X20 2SA786Q
X21 2SC2063PQ
D11-D20 1SS133
X1 2SC2063PQ
CN1
UL SW
CN2
TAKE-UP SENS.
CN3
START SENS.
END SENS.
CN4
CASS. LAMP
DEW SENS.
MIC JACK
EAR. JACK
REMOTE
GND
CAMERA
IC5 NJM2901N
X17 2SA786Q
X19 2SC2063Q
X18 2SC2063Q
COUNTER S8018V
X16 2SC2063Q
X14 2SD1055 PQ
X13 2SC2063Q
X12 2SC2063PQ
X11
X10 2SC2063QR
X7 X6 2SC2063PQ, 2SC2673PQ
X9 2SC2063PQ
X8 2SC2063PQ
IC1 TC4512BP
IC2 TC4512BP
IC3 TC4015BP
IC4 UPA2004
SW7 FWD
SW9 REV
SW5 STOP
SW4 F.F
SW6 REW
SW8 PLAY
SW10 REC
SW12 S/P
SW11 DUB
SW13 REC SAFETY
D1-D7 PR3402S
X3 2SC2063Q
X2 2SC1881
EDIT-1
EDIT-2
CN5
501 10 V
502 I2
503 I1
504 B2
505 B0
506 A0
507 U/D
508 9 V
509 GND
510 AL/SP
511 SL VR
512 I0
513 B3
514 B1
515 A1
516 OPR
517 LED. D
518 LED. CK
FROM/TO 03 MECHACON
CN6
601 A.M.
602 D. FF.
603 RESET
604 EAR. GND
605 TIMER
606 C. SIG
607 BATT. CHECK
608 UNLOADING
609 C. 12 V
610 C. LAMP
611 AL SW
612 D.M.
613 EAR
614 A.REC
615 C. GND
616 REC
617 AUDIO
618 12 V
FROM/TO 03 MECHACON

CAMERA CONN.

1. VIDEO IN/OUT
2. GND
3. BATT. ALARM + REC RUN
4. GND
5. AUDIO (P.B.)
6. CTL
7. AUDIO (REC.)
8. GND
9. GND
10. POWER (12 V)

REMOTE CONN.

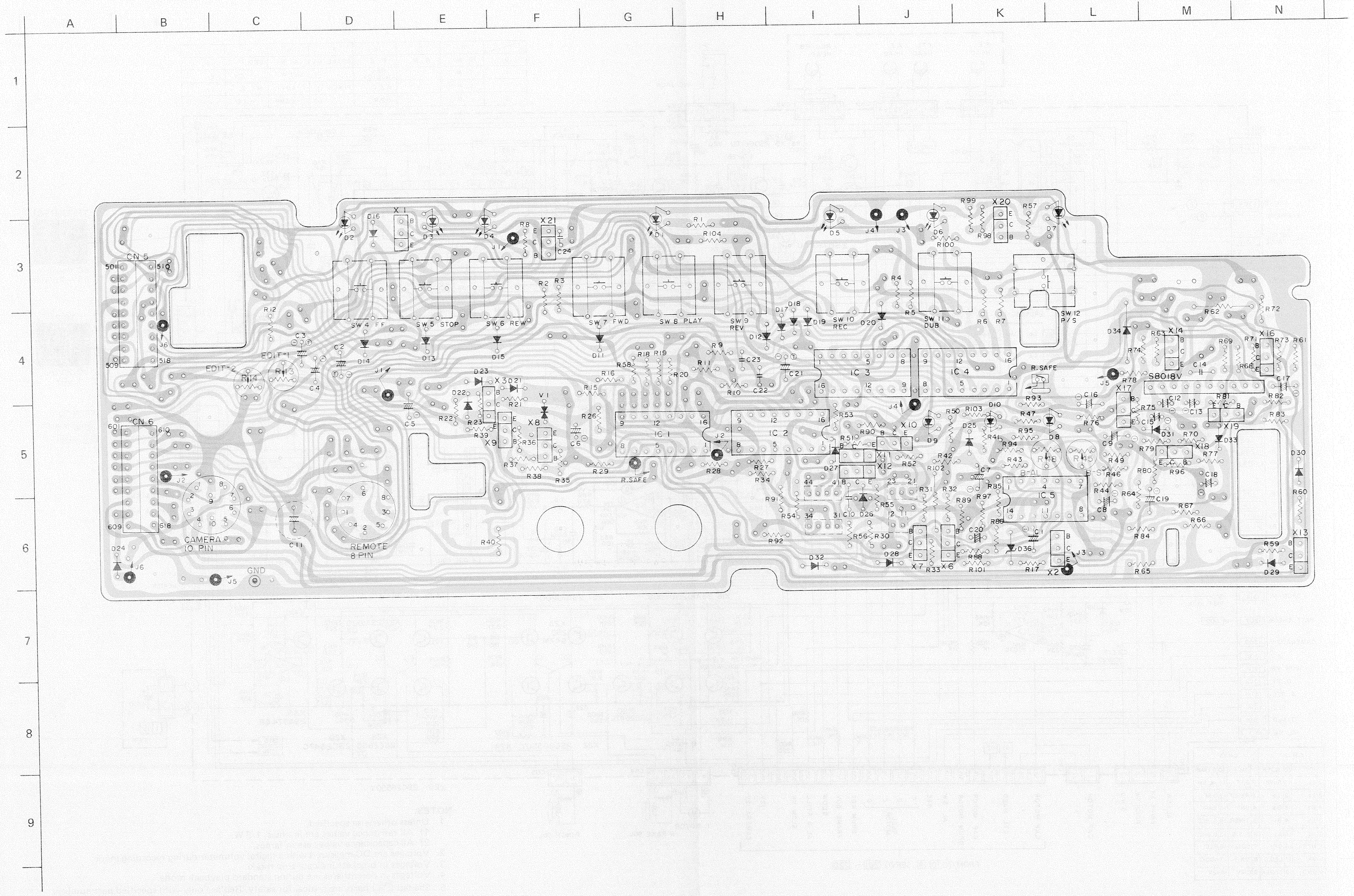
1. B_1
2. B_3
3. I_2
4. B_2
5. I_1
6. I_0
7. B_0
8. SLOW VR

LED

D1. PB
D2. FF
D3. STOP
D4. REW
D5. REC
D6. DUB
D7. S/P
D8. RUN
D9. DEW
D10. B.DOWN

NOTES:
Unless otherwise specified;
1) All resistance values are in ohms, 1/8 W.
2) All capacitance values are in μF.
3) Voltage are DC-measured with a digital voltmeter during stop mode.

8-27. MECHANISM CONTROL (MECHACON) CIRCUIT BOARD (EG/EK/S)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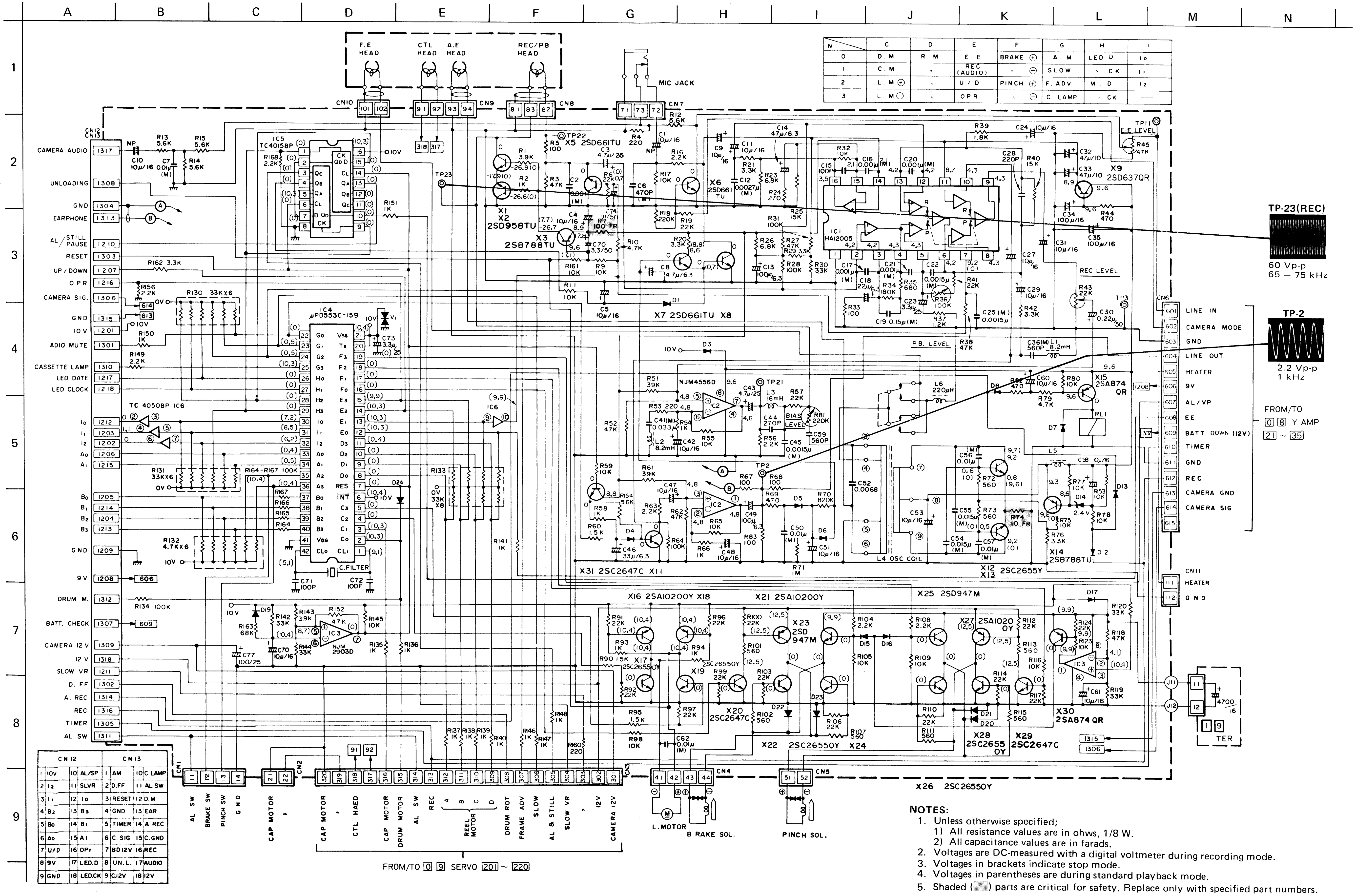
8
9
CN 5
501
510
509
518
CN 6
601
610
609
618
J6
J2
J1
J3
J4
J5
J6
D24
GND
CAMERA
10 PIN
REMOTE
8 PIN
EDIT-2
EDIT-1
R14
R13
C3
C2
C4
C11
C5
C6
D2
D3
D4
D16
D14
D13
D15
D11
D1
D5
D6
D7
X1
X21
C24
R8
SW 4 FF
SW 5 STOP
SW 6 REW
SW 7 FWD
SW 8 PLAY
SW 9
REV
SW 10
REC
SW 11
DUB
SW 12
P/S
R2
R3
R1
R104
R4
R5
R6
R7
R99
X20
R57
R98
R100
D17
D18
D19
D20
D12
D34
R12
D23
D21
D22
X3
R21
R22
R23
R39
X9
X8
V1
R36
R37
R38
R35
R40
R26
R15
R16
R58
R18
R19
R20
R9
R11
R10
C23
C21
C22
IC 1
IC 2
IC 3
IC 4
IC 5
R.SAFE
R29
R28
R27
R34
R53
R51
R90
X10
X11
X12
R52
D27
D9
D10
D25
D8
R103
R50
R93
R47
R95
R94
R41
R42
R43
R48
R45
R102
C7
R85
R31
R32
R89
R97
R86
B-AL
R91
R54
R92
R55
D26
C10
R56
R30
D28
X7
R33
X6
C20
R88
R101
C1
D36
R17
X2
J3
D32
R63
X14
R74
R69
R71
X16
R73
R61
R68
C14
S8018V
J5
R78
X17
C16
C17
R76
R75
C15
C12
C13
R81
R82
R83
X19
D31
D33
R70
R79
X18
R77
C9
R49
R46
R44
C8
R64
C19
R80
R96
C18
R67
R66
R84
R65
R59
D29
X13
D30
R60
R62
R72

8-28. AUDIO & CPU CIRCUIT SCHEMATIC DIAGRAM (EG/EK/S)



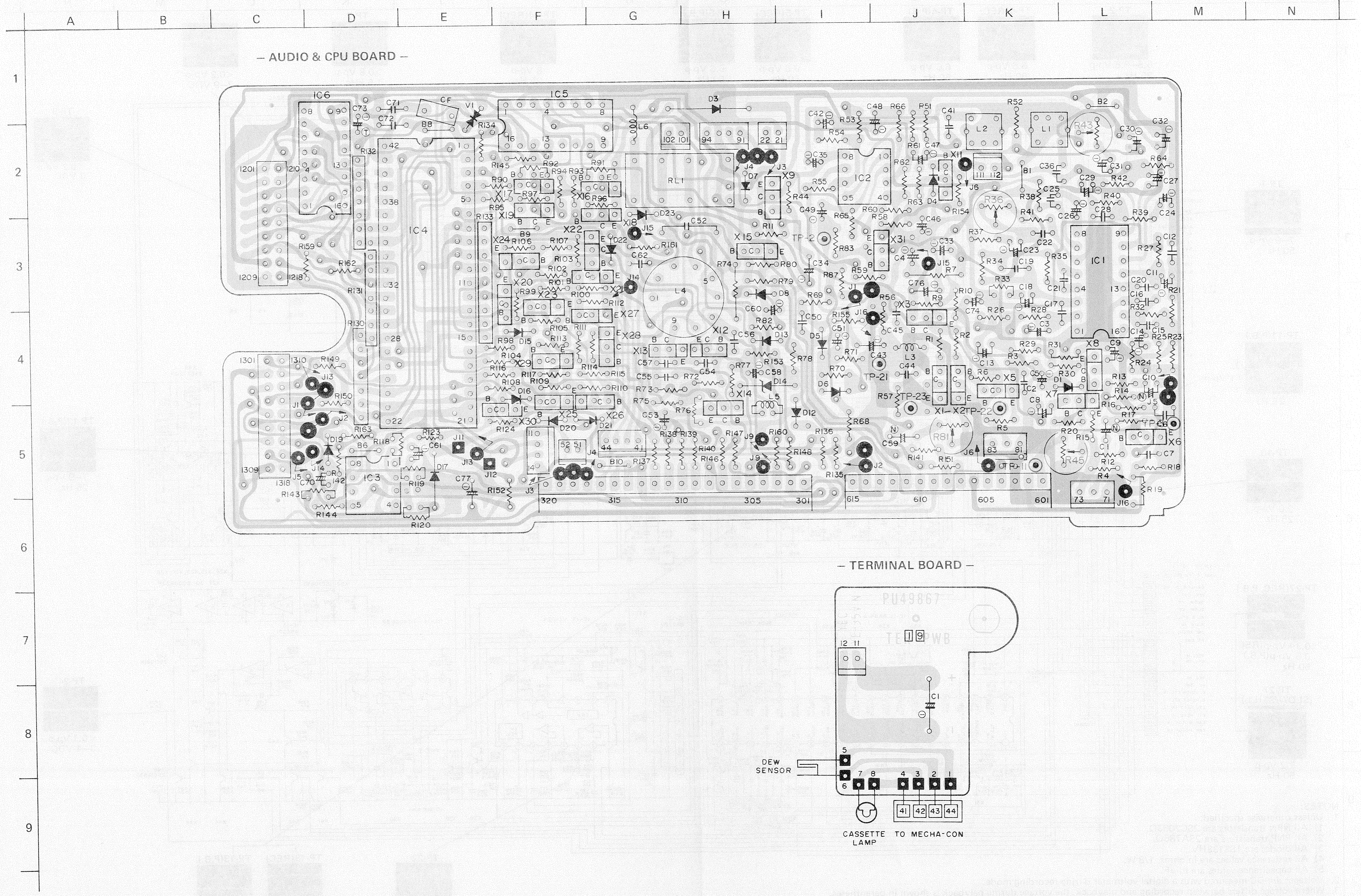
F.E HEAD
CTL HEAD
A.E HEAD
REC/PB HEAD
MIC JACK
IC5 TC4015BP
IC4 μPD553C-159
IC6 TC 4050BP
IC1 HA12005
IC2 NJM4556D
IC3 NJM 2903D
X1 X2 2SD958TU
X3 2SB788TU
X5 2SD661TU
X7 2SD661TU X8
X9 2SD637QR
X15 2SA874 QR
X14 2SB788TU
X12 X13 2SC2655Y
X31 2SC2647C X11
X16 2SA1020OY X18
X21 2SA1020OY
X25 2SD947M
X23 2SD 947M
X27 2SA1020 OY
X20 2SC2647C
X22 2SC2655OY X24
X28 2SC2655 OY
X29 2SC2647C
X30 2SA874 QR
X26 2SC2655OY
L4 OSC COIL
TP23
TP22
TP21
TP2
TP11 E-E LEVEL
REC LEVEL
P.B. LEVEL
BIAS LEVEL
TP-23(REC)
60 Vp-p
65 — 75 kHz
TP-2
2.2 Vp-p
1 kHz
FROM/TO 0 8 Y AMP 21 ~ 35
LINE IN
CAMERA MODE
GND
LINE OUT
HEATER
9V
AL/VP
EE
BATT DOWN (12V)
TIMER
GND
REC
CAMERA GND
CAMERA SIG
CN11 HEATER GND
L.MOTOR
B RAKE SOL.
PINCH SOL.
FROM/TO 0 9 SERVO 201 ~ 220

N	C	D	E	F	G	H	I
0	D. M	R. M	E. E	BRAKE ⊕	A. M	LED D	I_0
1	C. M	〃	REC (AUDIO)	〃 ⊖	SLOW	〃 CK	I_1
2	L. M ⊕	〃	U / D	PINCH ⊕	F. ADV	M. D	I_2
3	L. M ⊖	〃	OPR	〃 ⊖	C LAMP	〃 CK	—

CN 12				CN 13			
1	10V	10	AL/SP	1	AM	10	C LAMP
2	I_2	11	SLVR	2	D.FF	11	AL. SW
3	I_1	12	I_0	3	RESET	12	D.M
4	B_2	13	B_3	4	GND	13	EAR
5	B_0	14	B_1	5	TIMER	14	A. REC
6	A_0	15	A_1	6	C. SIG	15	C.GND
7	U/D	16	OPr	7	BD12V	16	REC
8	9V	17	LED.D	8	UN.L.	17	AUDIO
9	GND	18	LED.CK	9	C.12V	18	12V

NOTES:
1. Unless otherwise specified;
   1) All resistance values are in ohws, 1/8 W.
   2) All capacitance values are in farads.
2. Voltages are DC-measured with a digital voltmeter during recording mode.
3. Voltages in brackets indicate stop mode.
4. Voltages in parentheses are during standard playback mode.
5. Shaded (▨) parts are critical for safety. Replace only with specified part numbers.

8-29. AUDIO & CPU, AND TERMINAL CIRCUIT BOARDS (EG/EK/S)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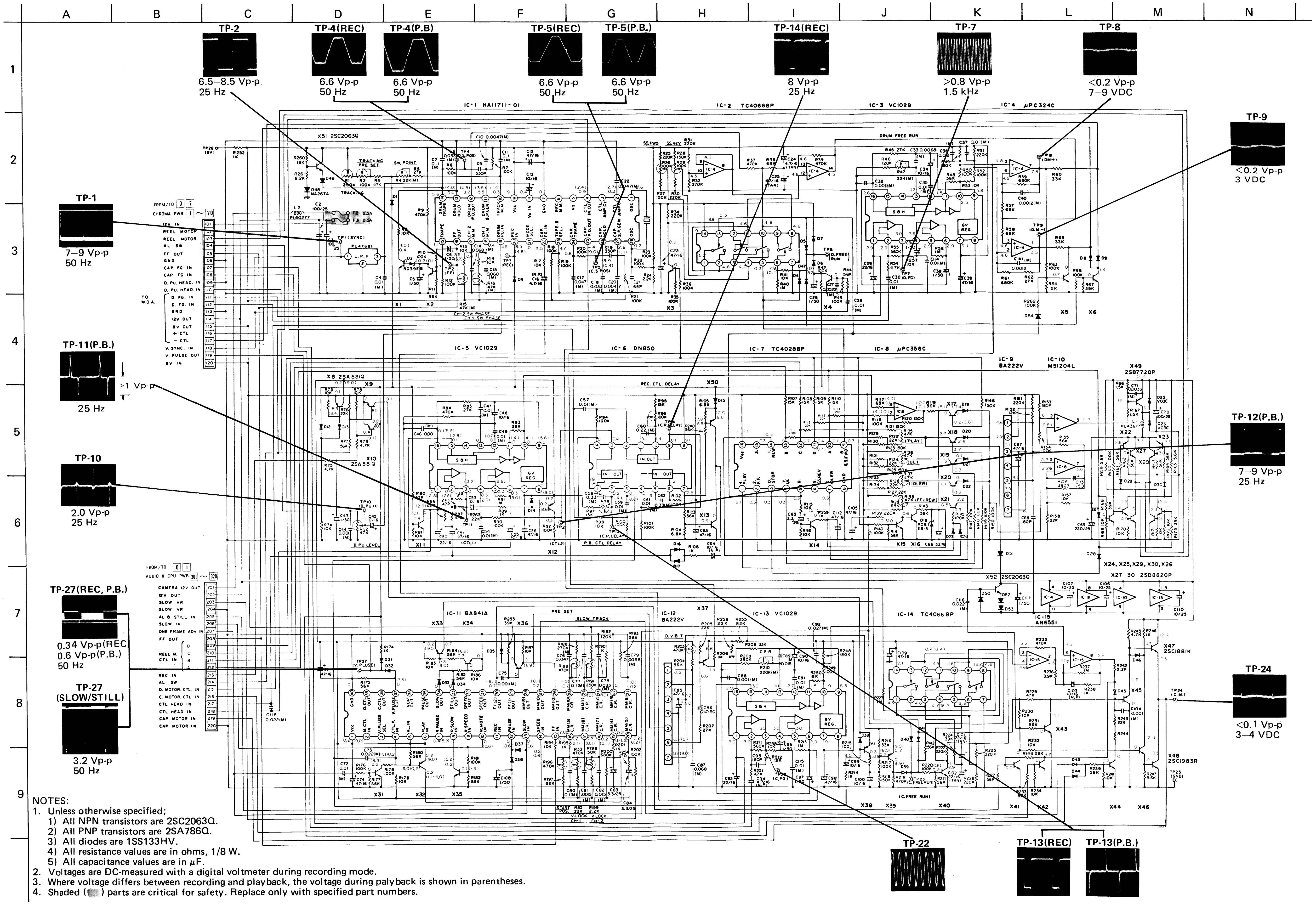
8
9
– AUDIO & CPU BOARD –
IC1
IC2
IC3
IC4
IC5
IC6
RL1
L1
L2
L3
L4
L5
L6
CF
V1
R36
R43
R45
R81
TP-2
TP-21
TP-22
TP-23
TP-1
J1
J2
J3
J4
J5
J6
J9
J11
J12
J13
J14
J15
J16
X1
X2
X3
X5
X6
X7
X8
X9
X11
X12
X13
X14
X15
X16
X17
X18
X19
X20
X21
X22
X23
X24
X25
X26
X27
X28
X29
X30
X31
320
315
310
305
301
615
610
605
601
73
71
– TERMINAL BOARD –
PU49867
TE PWB
12
11
C1
DEW SENSOR
5
6
7
8
4
3
2
1
41
42
43
44
CASSETTE LAMP
TO MECHA-CON

8-30. SERVO CIRCUIT SCHEMATIC DIAGRAM (EG/EK/S)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N
1
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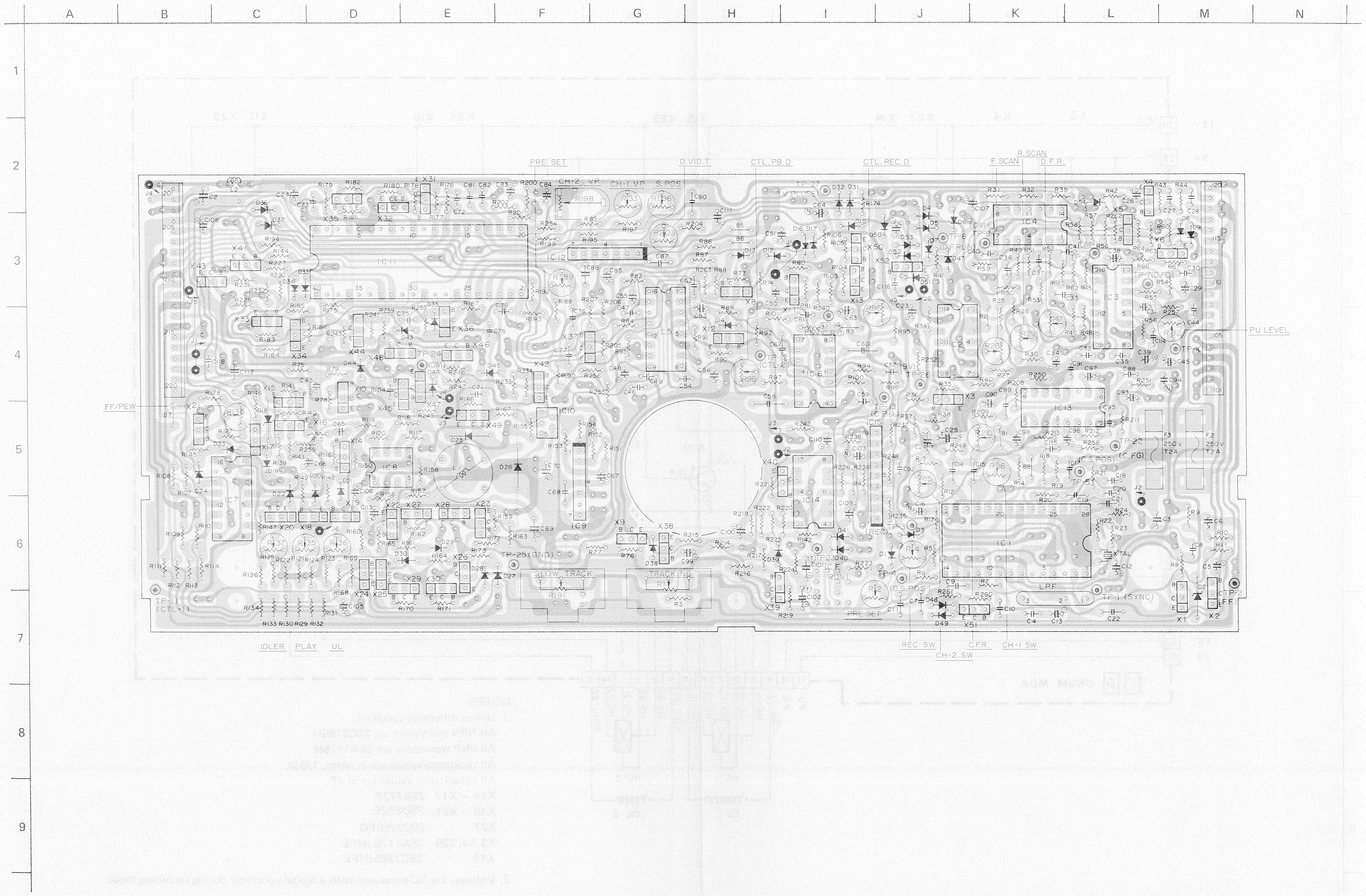
6
7
8
9
TP-2
6.5–8.5 Vp-p
25 Hz
TP-4(REC)
6.6 Vp-p
50 Hz
TP-4(P.B)
6.6 Vp-p
50 Hz
TP-5(REC)
6.6 Vp-p
50 Hz
TP-5(P.B.)
6.6 Vp-p
50 Hz
TP-14(REC)
8 Vp-p
25 Hz
TP-7
>0.8 Vp-p
1.5 kHz
TP-8
<0.2 Vp-p
7–9 VDC
TP-9
<0.2 Vp-p
3 VDC
TP-1
7–9 Vp-p
50 Hz
TP-11(P.B.)
>1 Vp-p
25 Hz
TP-10
2.0 Vp-p
25 Hz
TP-12(P.B.)
7–9 Vp-p
25 Hz
TP-27(REC, P.B.)
0.34 Vp-p(REC)
0.6 Vp-p(P.B.)
50 Hz
TP-27
(SLOW/STILL)
3.2 Vp-p
50 Hz
TP-24
<0.1 Vp-p
3–4 VDC
TP-22
TP-13(REC)
TP-13(P.B.)
IC-1 HA11711-01
IC-2 TC4066BP
IC-3 VC1029
IC-4 μPC324C
IC-5 VC1029
IC-6 DN850
IC-7 TC4028BP
IC-8 μPC358C
IC-9 BA222V
IC-10 M51204L
IC-11 BA841A
IC-12 BA222V
IC-13 VC1029
IC-14 TC4066BP
IC-15 AN6551
X51 2SC2063Q
X8 2SA881Q
X10 2SA981Q
X49 2SB772QP
X52 2SC2063Q
X47 2SC1881K
X48 2SC1983R
X24, X25, X29, X30, X26
X27 30 2SD882QP
FROM/TO CHROMA PWB 101 ~ 120
12V IN
REEL MOTOR
REEL MOTOR
AL SW
FF OUT
GND
CAP FG IN
CAP FG IN
D. PU. HEAD. IN
D. PU. HEAD. IN
TO M.D.A.
D. FG. IN
D. FG. IN
GND
12V OUT
9V OUT
+ CTL
– CTL
V. SYNC. IN
V. PULSE OUT
9V IN
FROM/TO AUDIO & CPU PWB 301 ~ 320
CAMERA 12V OUT
12V OUT
SLOW VR
SLOW VR
AL & STILL IN
SLOW IN
ONE FRAME ADV. IN
FF OUT
REEL M. CTL IN
REC IN
AL SW
D. MOTOR CTL. IN
C. MOTOR CTL. IN
CTL HEAD IN
CTL HEAD IN
CAP MOTOR IN
CAP MOTOR IN
TRACKING PRE SET
SW. POINT
DRUM FREE RUN
REC. CTL. DELAY
P.B. CTL DELAY
PRE SET
SLOW TRACK
D. VIB. T
C.F.R.
IC FREE RUN
TP1 (SYNC)
L.P.F
PU4768I
TP6 (D.FREE) RUN
TP3 (REC)
TP8 (DM+)
TP9 (D.M.-)
TP10 (D.PU.H)
D.PU.LEVEL
TP27 (V.PLUSE)
TP24 (C.M.)
TP25 (GND)
S&H
6V REG.
X1
X2
X3
X4
X5
X6
X11
X12
X13
X14
X15
X16
X31
X32
X33
X34
X35
X36
X37
X38
X39
X40
X41
X42
X43
X44
X45
X46
X50

NOTES:
1. Unless otherwise specified;
   1) All NPN transistors are 2SC2063Q.
   2) All PNP transistors are 2SA786Q.
   3) All diodes are 1SS133HV.
   4) All resistance values are in ohms, 1/8 W.
   5) All capacitance values are in μF.
2. Voltages are DC-measured with a digital voltmeter during recording mode.
3. Where voltage differs between recording and playback, the voltage during palyback is shown in parentheses.
4. Shaded (▨) parts are critical for safety. Replace only with specified part numbers.

8-31. SERVO CIRCUIT BOARD (EG/EK/S)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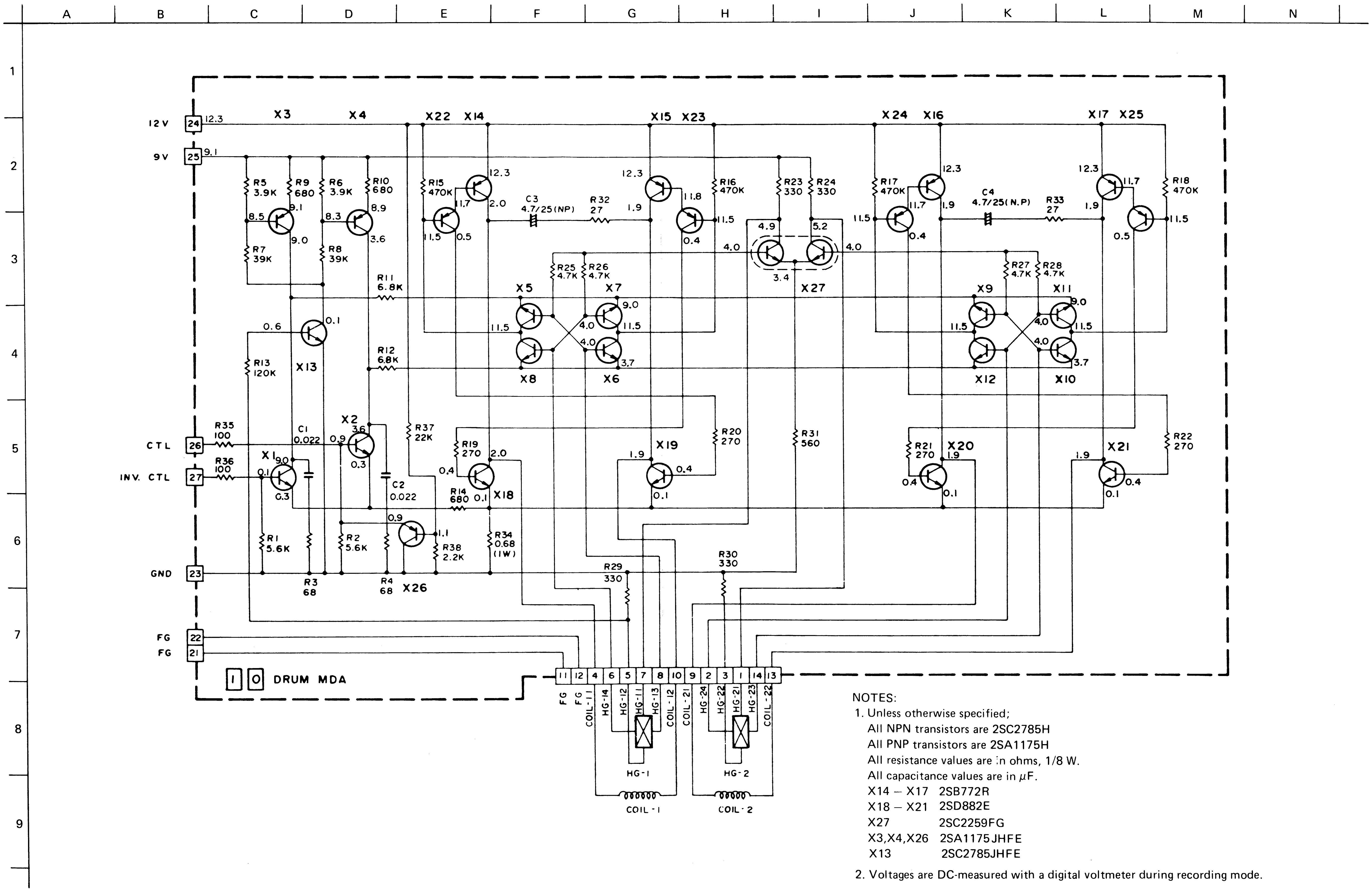
9
PRE SET
D.VID.T
CTL.PB.D
CTL.REC.D
R.SCAN
F.SCAN
D.F.R.
PU LEVEL
FF/PEW
CH-2.VP
CH-1.VP
S.POS
TP-27
V.PULSE
TP-25(GND)
SLOW TRACK
TRACKING
TP-1 (CTL-1)
TP-1 (SYNC)
TP-2 F.F.
LPF
XTAL
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC15
F3 250V T2A
F2 250V T2A
IDLER
PLAY
UL
REC SW
C.F.R.
CH-1 SW
CH-2 SW
PRE SET

8-32. MOTOR DRIVE AMPLIFIER (MDA) SCHEMATIC DIAGRAM (EG/EK/S)


A B C D E F G H I J K L M N
1 2 3 4 5 6 7 8 9
12V 24 12.3
9V 25 9.1
X3 X4 X22 X14 X15 X23 X24 X16 X17 X25
R5 3.9K R9 680 R6 3.9K R10 680
R7 39K R8 39K
R11 6.8K R12 6.8K R13 120K
R15 470K R16 470K R17 470K R18 470K
C3 4.7/25(NP) R32 27 C4 4.7/25(N.P) R33 27
R23 330 R24 330
R25 4.7K R26 4.7K R27 4.7K R28 4.7K
X5 X7 X8 X6 X9 X11 X12 X10 X27
X13 X1 X2 X26 X18 X19 X20 X21
R35 100 R36 100 C1 0.022 C2 0.022
R37 22K R19 270 R14 680 R34 0.68 (1W) R38 2.2K
R20 270 R31 560 R21 270 R22 270
R1 5.6K R2 5.6K R3 68 R4 68
R29 330 R30 330
CTL 26 INV. CTL 27 GND 23 FG 22 FG 21
1 0 DRUM MDA
11 12 4 6 5 7 8 10 9 2 3 1 14 13
FG FG COIL-11 HG-14 HG-12 HG-11 HG-13 COIL-12 COIL-21 HG-24 HG-22 HG-21 HG-23 COIL-22
HG-1 HG-2 COIL-1 COIL-2

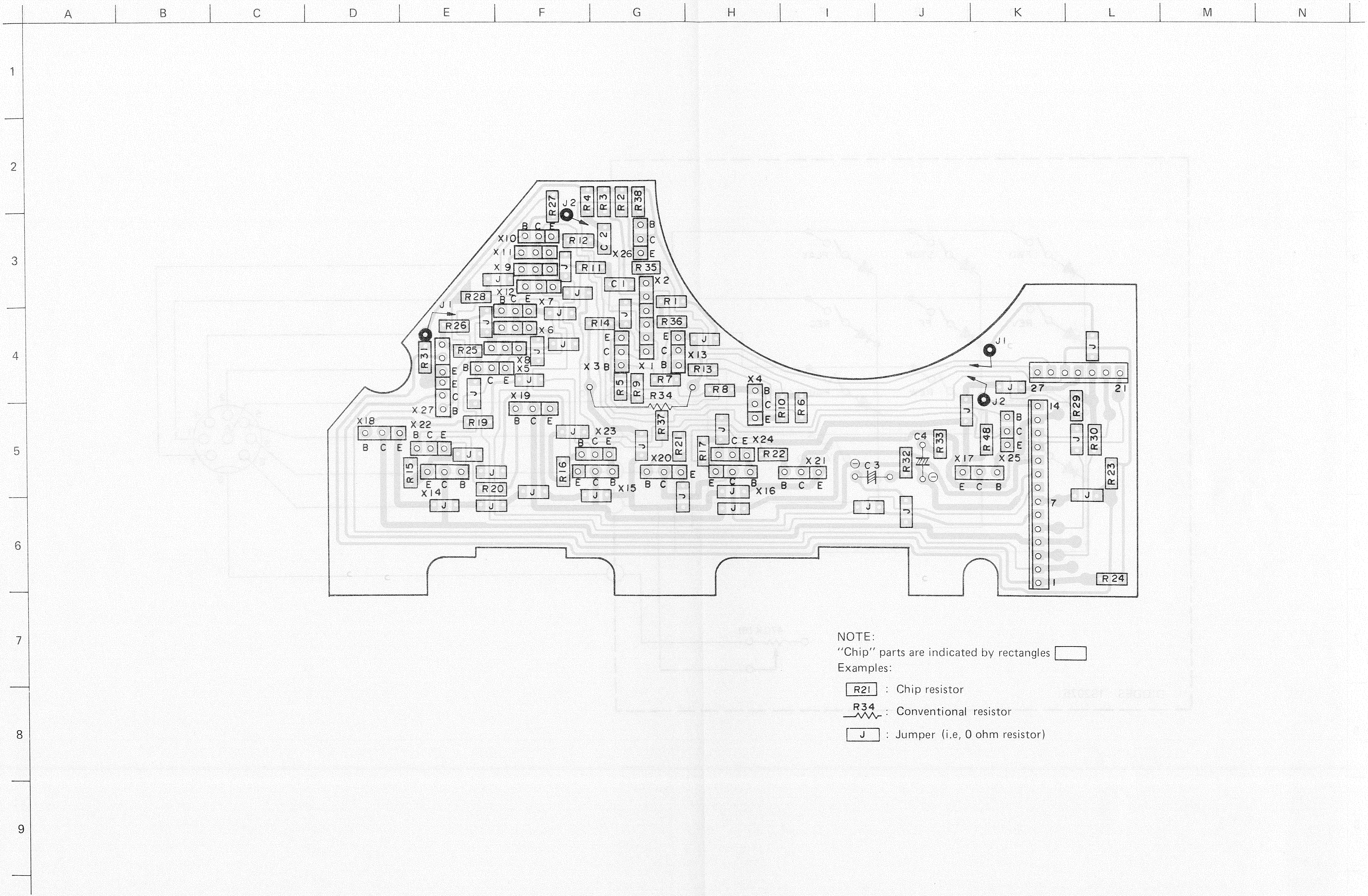
NOTES:

1. Unless otherwise specified;
   All NPN transistors are 2SC2785H
   All PNP transistors are 2SA1175H
   All resistance values are in ohms, 1/8 W.
   All capacitance values are in μF.

X14 – X17	2SB772R
X18 – X21	2SD882E
X27	2SC2259FG
X3,X4,X26	2SA1175JHFE
X13	2SC2785JHFE

2. Voltages are DC-measured with a digital voltmeter during recording mode.

8-33. MOTOR DRIVE AMPLIFIER (MDA) CIRCUIT BOARD (EG/EK/S)


A
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G
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K
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M
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1
2
3
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6
7
8
9
R27
J2
R4
R3
R2
R38
X10
X11
X9
X12
X7
X6
X8
X5
R12
C2
X26
R11
R35
C1
X2
R1
R36
R14
R28
J1
R26
R25
R31
X13
X3
X1
R13
R5
R9
R7
R34
R37
R8
X4
R10
R6
X27
X19
R19
X18
X22
R15
X14
R20
X23
R16
X15
X20
R21
R17
X24
R22
X16
X21
C3
C4
R32
R33
X17
R48
X25
R29
R30
R23
R24
J
B
C
E
27
21
14
7
1

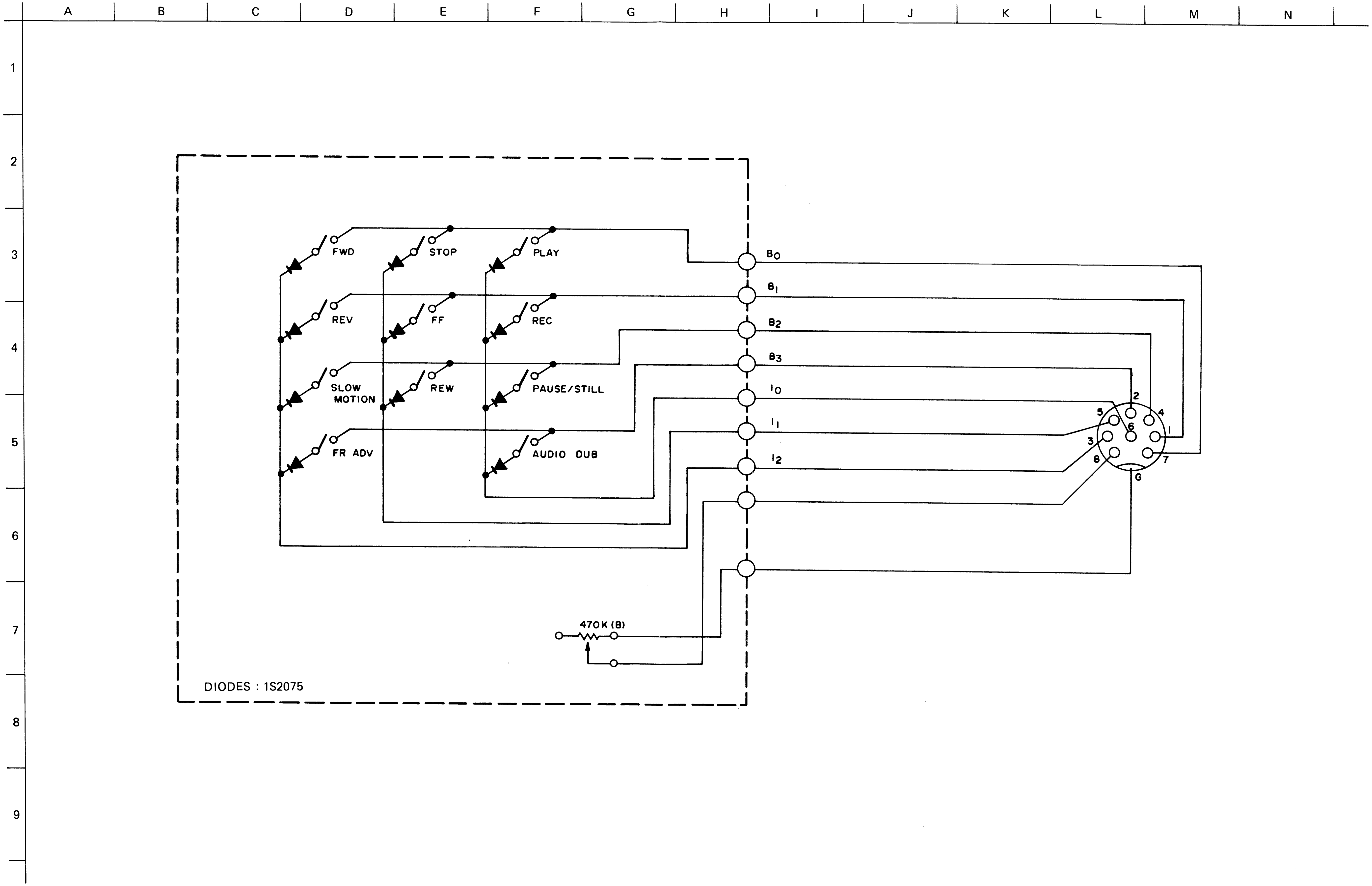
NOTE:
"Chip" parts are indicated by rectangles ▭
Examples:

▭ R21 : Chip resistor

R34 : Conventional resistor

▭ J : Jumper (i.e, 0 ohm resistor)

8-34. REMOTE CONTROL UNIT SCHEMATIC DIAGRAM (EG/EK/S)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
FWD
STOP
PLAY
REV
FF
REC
SLOW MOTION
REW
PAUSE/STILL
FR ADV
AUDIO DUB
B0
B1
B2
B3
I0
I1
I2
2
5
4
6
1
3
8
7
G
470K (B)
DIODES : 1S2075

SECTION 9

ELECTRICAL PARTS LIST

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9-1. AUDIO & CPU P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
1-1	BA709772	PC AUDIO & CPU BLK VP-77
1-IC1	EI328594	IC HA12005
1-IC2	EI307644	IC NJM4556D
1-IC3	EI709677	IC NJM2903D
1-IC4	EI709678	IC μPD553C-159
1-IC5	EI709679	IC TC4015BP
1-IC6	EI330391	IC TC4050BP
1-X1,2	ET704386	TR 2SD958TU
1-X3	ET704388	TR 2SB788TU
1-X5to8	ET704387	TR 2SD661TU
1-X9	ET318593	TR 2SD637 Q,R
1-X11	ET705198	TR 2SC2647C
1-X12,13	ET709681	TR 2SC2655Y
1-X14	ET704388	TR 2SB788TU
1-X15	ET705199	TR 2SA874QR
1-X16	ET309184	TR 2SA1020 O,Y
1-X17	ET309211	TR 2SC2655 O,Y
1-X18	ET309184	TR 2SA1020 O,Y
1-X19	ET309211	TR 2SC2655 O,Y
1-X20	ET705198	TR 2SC2647C
1-X21	ET309184	TR 2SA1020 O,Y
1-X22	ET309211	TR 2SC2655 O,Y
1-X23	ET709684	TR 2SD947M
1-X24	ET309211	TR 2SC2655 O,Y
1-X25	ET709684	TR 2SD947M
1-X26	ET309211	TR 2SC2655 O,Y
1-X27	ET309184	TR 2SA1020 O,Y
1-X28	ET309211	TR 2SC2655 O,Y
1-X29	ET705198	TR 2SC2647C
1-X30	ET705199	TR 2SA874QR
1-X31	ET705198	TR 2SC2647C
1-D1	ED307572	D SILICON H 1SS133
1-D3	ED421795	D SILICON V03C 200/1.3A
1-D4to8	ED307572	D SILICON H 1SS133
1-D12,13	ED307572	D SILICON H 1SS133
1-D14	ED709685	D ZENER RD2.7EB1
1-D15,16	ED307572	D SILICON H 1SS133
1-D17	ED421795	D SILICON V03C 200/1.3A
1-D19to24	ED307572	D SILICON H 1SS133
1-L1	EO709695	COIL 8.2MH
1-L2	EO709695	COIL 8.2MH
1-L3	EO704612	COIL PEAKING
1-L4	EO709696	COIL OSC
1-L5	EO741527	COIL PEAKING
1-L6	EO741019	COIL PEAKING
1-RL1	EP709697	RELAY
1-V1	ED709698	D VARISTOR
1-R7	ER709686	⚠ R FUSE 101
1-R36	EV709687	R S-FIX 104
1-R43	EV709688	R S-FIX 223
1-R45	EV709689	R S-FIX 473
1-R74	ER709690	⚠ R FUSE 100
1-R81	EV702380	R S-FIX 224
1-R130	ER709691	R ARRAY
1-R131	ER709691	R ARRAY
1-R132	EI709692	R ARRAY
1-R133	ER705135	R ARRAY
1-C1	EC741007	C EC V NP 100 16DC
1-C10	EC741007	C EC V NP 100 16DC
1-C52	EC709693	C MC 682K 600DC
1-C59	EC709694	C STY 561K 125DC
1-C73	EC702980	C TT 3R3M 25DC
1-2	ER705375	FILTER CE CSB-400P

9-2. MECHANISM CONTROL P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
2-1	BA709774	PC MECHANISM CTL BLK VP-77
2-IC1,2	EI709699	IC TC4512BP
2-IC3	EI709679	IC TC4015BP
2-IC4	EI705122	IC μPA2004C
2-IC5	EI709700	IC NJM2901N
2-X1	ET709701	TR 2SC2063PQ
2-X2	ET709702	TR 2SC1881K
2-X3	ET709704	TR 2SC2063QR
2-X6	ET709703	TR 2SC2673PQ
2-X7to9	ET709701	TR 2SC2063PQ
2-X10	ET709704	TR 2SC2063QR
2-X11,12	ET709701	TR 2SC2063PQ
2-X13	ET709704	TR 2SC2063QR
2-X14	ET709705	TR 2SD1055PQ
2-X16	ET709701	TR 2SC2063PQ
2-X17	ET741585	TR 2SA786Q
2-X18	ET709704	TR 2SC2063QR
2-X19	ET709701	TR 2SC2063PQ
2-X20	ET741585	TR 2SA786Q
2-X21	ET709701	TR 2SC2063PQ
2-D1to10	ED709706	D LED PR3402S
2-D11to33	ED307572	D SILICON H 1SS133
2-D34	ED740996	D SILICON OA90
2-D36	ED701899	D ZENER RD12EB1
2-SW4to12	ES709708	SW PUSH
2-SW13	ES709710	SW LEAF
2-V1	ED709698	D VARISTOR
2-R13,14	EV701950	R S-FIX 474
2-R45	EV704438	R S-FIX 472
2-R48	EV704438	R S-FIX 472
2-C3,4	EC700036	C TT R15M 35DC
2-C11	EC709707	C EC 335 1.6DC
2-C20	EC705136	C EC NP 1R0 50DC
2-C21	EC702763	C TT 100 16DC
2-2	MC709709	LCD COUNTER S8018V

9-3. PRE/RECORD AMP P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
3-1	BA709775	PC PRE AMP BLK VP-77
3-IC1	EI709711	IC HA11716
3-X1,2	ET709704	TR 2SC2063QR
3-X3	ET741585	TR 2SA786Q
3-X4	ET709712	TR 2SA874Q
3-X5,6	ET705338	TR 2SC1652Q
3-X7	ET709712	TR 2SA874Q
3-X8,9	ET709704	TR 2SC2063QR
3-X10,11	ET402794	TR 2SC828 Q
3-X12to16	ET709704	TR 2SC2063QR
3-D2,3	ED307572	D SILICON H 1SS133
3-L1	EO702403	COIL PEAKING 100μH
3-L2,3	EO709716	COIL FIX 2 56μH
3-L4,5	EO706349	COIL FIX 1 8.2μH
3-L6	EO709717	COIL PEAKING
3-L7	EO702403	COIL PEAKING 100μH
3-L8	EO702412	COIL PEAKING
3-L9	EO702405	COIL PEAKING
3-L10	EO706283	COIL FIX 2 15μH
3-L11	EO709718	COIL FIX 2 150μH
3-L12	EO705357	COIL PEAKING
3-LPF1	ER704370	FILTER LP
3-DL1	EI704382	DL 1H
3-R1,2	EV704442	R S-FIX 102
3-R17	ER709834	R MF 1/2W 100J
3-R19,20	ET709713	R MF 1/2W 4R7J
3-R24	EV709714	R S-FIX 101
3-R35,36	EV704439	R S-FIX 103
3-R51	EV704442	R S-FIX 102
3-C11,12	EC702763	C TT 100 16DC
3-C17,18	EC709715	C S-FIX

9-4. CHROMA P.C BOARD BLOCK (EG/EK)

REF. NO.	PARTS NO.	DESCRIPTION
4-1	BA709776	PC CHROMA BLK VP-77EG
4-1	BA709783	PC CHROMA BLK VP-77EK
4-IC1	EI702410	IC 5HC3
4-IC2	EI318371	IC HA11710
4-IC3	EI318372	IC HA11717
4-IC4	EI318373	IC HA11706
4-IC7	EI318373	IC HA11706
4-X1	ET703050	TR 2SB566C
4-X2	ET706244	TR 2SA881 Q
4-X3	ET741584	TR 2SC2063Q
4-X4,5	ET706244	TR 2SA881 Q
4-X6	ET741584	TR 2SC2063Q
4-X7,8	ET741585	TR 2SA786Q
4-X9	ET741584	TR 2SC2063Q
4-X10to12	ET741584	TR 2SC2063Q (EG)
4-X10to12	ET741585	TR 2SA786Q (EK)
4-X14	ET741584	TR 2SC2063Q
4-X15	ET741585	TR 2SA786Q
4-D1	ED305442	D ZENER H RD6.8E B
4-D2	ED307572	D SILICON H 1SS133
4-D3	ED700883	D ZENER RD3.9E B
4-D5	ED421795	D SILICON V03C 200/1.3A
4-D6,7	ED307572	D SILICON H 1SS133
4-D8,9	ED307572	D SILICON H 1SS133 (EG)
4-D10	ED740996	D SILICON OA90
4-D12	ED740996	D SILICON OA90 (EG)
4-D13	ED303133	D ZENER H RD3.6E B
4-D14to16	ED307572	D SILICON H 1SS133 (EG)
4-D15,16	ED303133	D ZENER H RD3.6E B (EK)
4-D17	ED421795	D SILICON V03C 200/1.3A
4-D18	ED307572	D SILICON H 1SS133 (EG)
4-L1,2	EO702403	COIL PEAKING 100μH
4-L3,4	EO709719	COIL
4-L5	EO704363	COIL CHOKE
4-L6,7	EO702403	COIL PEAKING 100μH
4-L8	EO741522	COIL PEAKING
4-L16	EO741027	COIL PEAKING
4-L17	EO702403	COIL PEAKING 100μH
4-DL1	EI709720	DL 2H
4-XTAL1	EI741044	OSC X'TAL 4.433619 MHz
4-XTAL2	EI741043	OSC X'TAL 4.435571 MHz
4-XTAL3	EI741044	OSC X'TAL 4.433619 MHz
4-BPF1,2	ER709721	FILTER
4-BPF3	ER704371	FILTER BP
4-LPF1	ER704370	FILTER LP
4-S1,2	ES709722	SW POWER
4-R17	EV704439	R S-FIX 103
4-R18	ED704356	THERMISTER ERT-D2FHK-153S
4-R24	EV704442	R S-FIX 102
4-R33	EV700000	R S-FIX 471
4-R46	EV704439	R S-FIX 103
4-R77	EV704439	R S-FIX 103
4-R89	EV702381	R S-FIX 332
4-R111	EV704439	R S-FIX 103
4-C46	EC741055	C S-FIX

9-5. CHROMA P.C BOARD BLOCK (S)

REF. NO.	PARTS NO.	DESCRIPTION
5-1	BA709786	PC CHROMA BLK VP-77S
5-IC1	EI704312	IC BA401
5-IC2	EI322312	IC M53274P
5-IC3,4	EI705347	IC μPD4528
5-IC5	EI705349	IC μPC1004C
5-IC6	EI709766	IC SN76515P
5-IC8	EI702410	IC 5HC3
5-X2to4	ET703003	TR 2SC2021Q
5-X8,9	ET703003	TR 2SC2021Q
5-X11	ET709768	TR 2SB633DE
5-X12	ET706244	TR 2SA881 Q
5-X13	ET310053	TR 2SC2021 Q,R
5-X14,15	ET706244	TR 2SA881 Q
5-D1	ED307572	D SILICON H 1SS133
5-D2	ED324458	D ZENER H RD5.1E B
5-D3to8	ED307572	D SILICON H 1SS133
5-D11	ED305442	D ZENER H RD6.8E B
5-D12	ED421795	D SILICON V03C 200/1.3A
5-D13	ED307572	D SILICON H 1SS133
5-D14	ED700883	D ZENER RD3.9E B
5-D16	ED421795	D SILICON V03C 200/1.3A
5-D17to19	ED307572	D SILICON H 1SS133
5-D22	ED709835	D SILICON MA27WA
5-L1	EO702403	COIL PEAKING 100μH
5-L8to10	EO702403	COIL PEAKING 100μH
5-L12,13	EO702403	COIL PEAKING 100μH
5-LC1	EO704367	COIL TRAP 1/2FH
5-BPF1	ER705361	FILTER BP
5-BPF2	ER705362	FILTER BP
5-BPF3	ER705364	FILTER BP
5-BPF4	ER705361	FILTER BP
5-EQ1	ER705367	EQ
5-EQ2	ER705368	EQ
5-EQ3	ER705369	EQ
5-BELL1	VT705370	BELL BLK
5-BELL2	VT705371	BELL BLK
5-BELL3	BV709845	BELL BLK
5-BELL4	VT705372	BELL BLK
5-S1,2	ES709722	SW POWER
5-R9	EV704442	R S-FIX 102
5-R11	ER741006	R OMF 1/2W 101J
5-R19	EV709687	R S-FIX 104
5-R21	EV709832	VR 103
5-R32	EV709687	R S-FIX 104
5-R33	ER700928	R MF 1/2W 101J
5-R42	EV700003	R S-FIX 473
5-R48	EV700003	R S-FIX 473
5-R52	EV709770	R S-FIX 333
5-R63	EV709770	R S-FIX 333
5-R65	ER700928	R MF 1/2W 101J
5-R71	EV704442	R S-FIX 102

9-6. Y AMP P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
6-1	BA709777	PC Y AMP BLK VP-77EG
6-1	BA709785	PC Y AMP BLK VP-77EK
6-1	BA709787	PC Y AMP BLK VP-77S
6-IC1	EI740977	IC VC2019
6-IC2	EI322308	IC HA11701
6-IC3	EI709723	IC HA11703-01
6-X1	ET705198	TR 2SC2647C
6-X2	ET741585	TR 2SA786Q
6-X3to14	ET705198	TR 2SC2647C
6-X15	ET704431	TR 2SD638R
6-X16to20	ET705198	TR 2SC2647C
6-X21	ET706244	TR 2SA881 Q
6-X22	ET705198	TR 2SC2647C
6-X23,24	ET706244	TR 2SA881 Q
6-D1to4	ED307572	D SILICON H 1SS133
6-D5	ED421795	D SILICON V03C 200/1.3A
6-D9	ED702872	D SILICON U05E
6-D10	ED307572	D SILICON H 1SS133
6-L1	EO709728	COIL CHOKE
6-L2	EO709729	COIL CHOKE
6-L3	EO709730	COIL FIX 2 120μH
6-L4	EO702405	COIL PEAKING
6-L5,6	EO702403	COIL PEAKING 100μH
6-L7	EO702403	COIL PEAKING 100μH
6-L9	EO709731	COIL FIX 2 3.3μH
6-L10,11	EO709732	COIL FIX 2 18μH
6-L12,13	EO702403	COIL PEAKING 100μH
6-L14	EO706282	COIL FIX 2 330μH
6-L15	EO702403	COIL PEAKING 100μH
6-L16	EO702405	COIL PEAKING
6-L18	EO702403	COIL PEAKING 100μH
6-L19	EO709733	COIL FIX 2 6.8μH
6-L20	EO709734	COIL FIX 2 1.5μH
6-L21	EO702405	COIL PEAKING
6-L22	EO709829	COIL FIX 2 270μH (S)
6-L23	EO702403	COIL PEAKING 100μH
6-L24	EO702403	COIL PEAKING 100μH (S)
6-LPF1	ER704369	FILTER LP (EG, EK)
6-LPF1	ER705359	FILTER LP (S)
6-LPF2	ER704369	FILTER LP (EG, EK)
6-LPF2	ER705360	FILTER LP (S)
6-EQ1	ER704374	EQ (EG, EK)
6-EQ1	ER705366	EQ (S)
6-EQ2	ER704374	EQ (EG, EK)
6-EQ2	ER705366	EQ (S)
6-EQ3	EI702780	EQ (EG, EK)
6-R12	EV704439	R S-FIX 103
6-R13	EV704438	R S-FIX 472
6-R17,18	EV704440	R S-FIX 223
6-R27	EV704436	R S-FIX 222
6-R38	EV704440	R S-FIX 223
6-R57	EV704442	R S-FIX 102
6-R73	EV704440	R S-FIX 223
6-R87	EV709724	R OMF 1/2W 470J
6-C1	EC709725	C EC NP 100 16DC
6-C5	EC709726	C EC 470M 10DC
6-2	BV709735	RF CONVERTER VP-77EG
6-2	BV709765	RF CONVERTER VP-77EK
6-2	BV709771	RF CONVERTER VP-77S

9-7. SERVO P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
7-1	BA709778	PC SERVO BLK VP-77
7-IC1	EI709736	IC HA11711-01
7-IC2	EI310036	IC TC4066BP
7-IC3	EI709737	IC VC1029
7-IC4	EI702413	IC μPC324C
7-IC5	EI709737	IC VC1029
7-IC6	EI709741	IC DN850
7-IC7	EI705079	IC TC4028BP
7-IC8	EI311392	IC μPC358C
7-IC9	EI702768	IC BA222V
7-IC10	EI709742	IC M51204L
7-IC11	EI709831	IC BA841A
7-IC12	EI702768	IC BA222V
7-IC13	EI709737	IC VC1029
7-IC14	EI310036	IC TC4066BP
7-IC15	EI705128	IC AN6551
7-X1to3	ET310053	TR 2SC2021 Q,R
7-X4	ET741584	TR 2SC2063Q
7-X5,6	ET310053	TR 2SC2021 Q,R
7-X8	ET706244	TR 2SA881Q
7-X9	ET741585	TR 2SA786Q
7-X10	ET706244	TR 2SA881Q
7-X11	ET310053	TR 2SC2021 Q,R
7-X12	ET741585	TR 2SA786Q
7-X13	ET310053	TR 2SC2021 Q,R
7-X14	ET741584	TR 2SC2063Q
7-X15to21	ET310053	TR 2SC2021 Q,R
7-X22,23	ET741585	TR 2SA786Q
7-X24to26	ET310053	TR 2SC2021 Q,R
7-X27to30	ET709743	TR 2SD882 Q,P
7-X31	ET741584	TR 2SC2063Q
7-X32,33	ET741585	TR 2SA786Q
7-X34,35	ET310053	TR 2SC2021 Q,R
7-X36	ET741584	TR 2SC2063Q
7-X37to39	ET741585	TR 2SA786Q
7-X40to44	ET310053	TR 2SC2021 Q,R
7-X45	ET741585	TR 2SA786Q
7-X46	ET310053	TR 2SC2021 Q,R
7-X47	ET709702	TR 2SC1881K
7-X48	ET703767	TR 2SC1983R
7-X49	ET709744	TR 2SB722 Q,P
7-X50	ET741585	TR 2SA786Q
7-X51,52	ET310053	TR 2SC2021 Q,R
7-D1	ED307572	D SILICON H 1SS133
7-D2	ED700883	D ZENER RD3.9E B
7-D3to9	ED307572	D SILICON H 1SS133
7-D12to17	ED307572	D SILICON H 1SS133
7-D18	ED322410	D ZENER RD9.1E B3
7-D19to24	ED307572	D SILICON H 1SS133
7-D25,26	ED421795	D SILICON V03C 200/1.3A
7-D27to47	ED307572	D SILICON H 1SS133
7-D48	ED740909	D MA26T-A
7-D49to54	ED307572	D SILICON H 1SS133
7-D55	ED421795	D SILICON V03C 200/1.3A
7-L1	EO709748	COIL
7-L2	EO709749	COIL
7-LPF1	ER703773	FILTER LP
7-XTAL1	EI703774	OSC X'TAL
7-R1	EV709745	VR ROTARY 250K
7-R2	EV704443	R S-FIX 104
7-R4	EV709688	R S-FIX 223
7-R15,16	EV709689	R S-FIX 473
7-R26	EV704443	R S-FIX 104
7-R29	EV704443	R S-FIX 104
7-R33	EV701950	R S-FIX 474
7-R47	EV709688	R S-FIX 223
7-R96	EV704443	R S-FIX 104
7-R98	EV704443	R S-FIX 104
7-R135to138	EV700003	R S-FIX 473
7-R189	EV701950	R S-FIX 474
7-R191	EV709745	VR ROTARY 250K
7-R196	EV702380	R S-FIX 224
7-R198	EV709746	VR 50K
7-R203	EV701950	R S-FIX 474
7-R210	EV702380	R S-FIX 224
7-C16	EC709747	C EC NP 4R7M 16DC
7-C24,25	EC702765	C TT 4R7M 16DC
7-C64	EC741007	C EC V NP 100 16DC
7-C94	EC709747	C EC NP 4R7M 16DC
7-C101,102	EC702956	C TT 220M 16DC
7-C103	EC741007	C EC V NP 100 16DC

9-8. DRUM MDA P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
8-1	BA709779	PC DRUM MDA BLK VP-77
8-X1,2	ET709750	TR 2SC2785J.H.F
8-X3,4	ET709752	TR 2SA1175JHFE
8-X5to12	ET709753	TR 2SC2785H
8-X13	ET709754	TR 2SC2785J.H.FE
8-X14to17	ET709755	TR 2SB772R
8-X18to21	ET709756	TR 2SD882E
8-X22to25	ET709757	TR 2SA1175H
8-X26	ET709752	TR 2SA1175JHFE
8-X27	ET304825	TR 2SC2259 F,G
8-R34	ER709758	R OMF 1W R68M
8-C3,4	EC709759	C EC NP 4R7M 25DC

9-9. SECAM DETECTOR P.C BOARD BLOCK (EG ONLY)

REF. NO.	PARTS NO.	DESCRIPTION
9-1	BA709781	PC SECAM DETECTION BLK VP-77EG
9-IC5	EI704312	IC BA401
9-IC6	EI709761	IC 21VT02
9-X13	ET705338	TR 2SC1652Q
9-L9	EO702403	COIL PEAKING 100μH
9-L10	EO741380	COIL
9-L11	EO706283	COIL FIX 2 15μH
9-L12	EO704365	COIL
9-L13	EO704366	COIL
9-L14	EO704367	COIL TRAP 1/2FH
9-L15	EO702777	COIL PEAKING
9-R95	EV704442	R S-FIX 102
9-R100	ED705354	THERMISTER ERT-02FGL601S

10. RELAY DRIVE P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
10-1	BA709782	PC RELAY DRIVE BLK VP-77
10-IC1	EI702768	IC BA222V
10-X1to3	ET741233	TR 2SC2021QRS
10-X4	ET709763	TR 2SD741 P,F
10-X5	ET741233	TR 2SC2021QRS
10-D1,2	ED307572	D SILICON H 1SS133
10-D3	ED421795	D SILICON V03C 200/1.3A

11. TERMINAL P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
11-C1	EC709760	C EC 472 16V

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BA709778	7-1
BA709779	8-1
BA709781	9-1
BA709782	10-1
BA709783	4-1
BA709785	6-1
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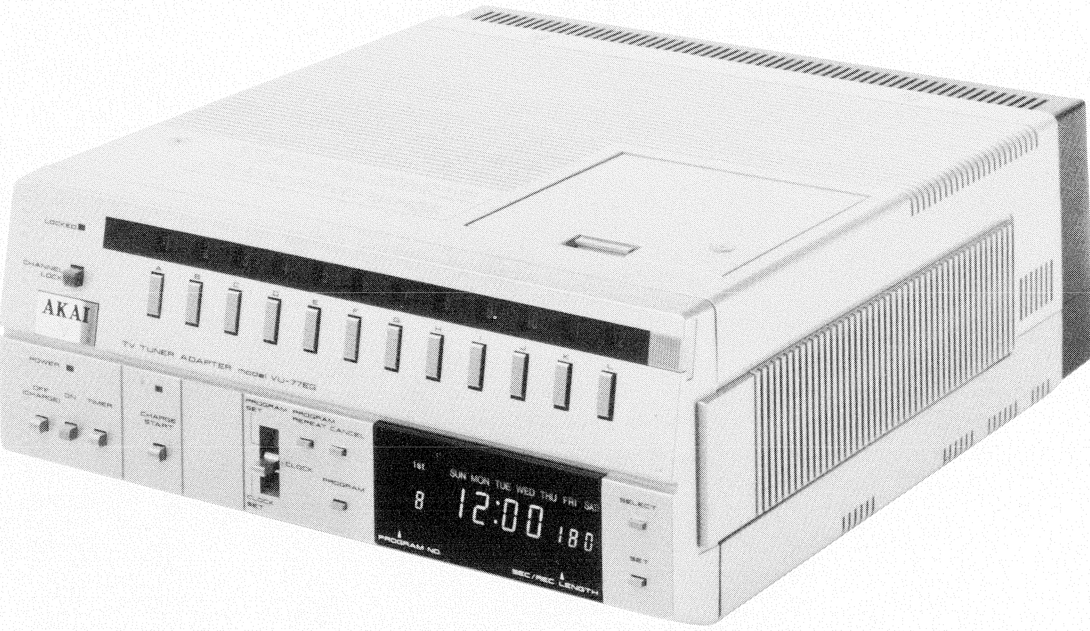
ZS705625	2-49
ZS705629	2-53
ZS705722	7-2
ZW704635	6-13
ZW705603	2-10
ZW705609	2-19
ZW705689	5-14
ZW705718	6-31
ZW740693	4-75
ZW740694	4-74



TUNER/ADAPTER

MODEL VU-77EG/EK/S

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SECTION 1

GENERAL DESCRIPTION

This manual provides service information for the AKAI VU-77EG/EK/S Tuner/Adapter.
The manual describes adjustment of electrical operation. Service procedures given herein cover only field maintenance services. Adjustments which require high-level instruments, jigs and techniques are excluded, since they should be performed at the factory.
Due to design modifications, the servicing procedures and data given in this manual are subject to prossible change without prior notice.

Thank you for purchasing the AKAI VU-77 Tuner/Adapter. This unit enables off-air VHF-UHF (EG/S), UHF (EK) TV programmes to be recorded with the AKAI VP-77 portable video cassette recorder. It also permits other functions such as automatic unattended recording of TV programmes with 2-week/8-programme timer and permits quick-changing of the BP-N77 rechargeable battery pack installed in the VP-77.

To obtain the best performance and greatest utilization from your VU-77, read this instruction booklet completely and carefully.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

CAUTION

Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial, prior to replacing the fuse, and prior to altering the voltage setting.

IMPORTANT (In the United Kingdom)
Mains Supply (AC 240V ~, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with following code:

Blue: Neutral
Brown: Live

If these colours do not correspond with the terminal identifications of your plug, connect as follows:
Blue wire to terminal coded N (Neutral) or coloured Black. Brown wire to terminal coded L (Live) or coloured Red.

If in doubt – consult a competent electrician.

NOTE: This equipment should be disconnected from the mains when in not use.

POWER SYSTEM

Connection to the mains supply

The operating voltage of this set is preset to 220V ~ at the factory.
Before connecting to mains, check that the voltage selector on the rear panel is set to the same voltage as your local mains supply.

Adapting to local power line

This set operates on either 110, 127, 220 or 240V ~. If the preset voltage is different from the power line voltage in your area, reset the voltage selector by inserting a screwdriver into the slot of the voltage selector and turning it until the correct voltage is displayed.

IMPORTANT: It is permissible to record television programmes only in the event that third party copyrights and other rights are not violated.

MAINS POWER SWITCH

The mains switch is located on the rear connector panel. Setting this switch to OFF removes all applied power from the set including the timer clock. Switching on and off the tuner section is performed with the front panel sub-power ON/OFF buttons.

NOTE: The rating plate is on the rear of the unit.
The safety caution label is on the bottom of the unit.

1-1. FEATURES

- A new, microcomputer-assisted timer that can perform multi-way programming for unattended recording up to 14 days in advance utilizing 8 separate programmes.
- 12-Channel electronic TV tuner having pushbutton (feather-light touch) channel selectors.
- Channel lock mechanism for preventing the selected channel from being changed by accidentally touching the channel selectors.
- In timer recording, the channel lock mechanism operates automatically.
- Serves as an AC power adapter for the VP-77 portable recorder.
- Quick-charging function for the BP-N77 rechargeable battery pack installed in the VP-77.
- Clock/timer memory hold system with a built-in rechargeable battery having a back-up time of about ten minutes after being charged for 48 hours.

1-2. PRECAUTIONS

- Prevent inflammables, water and metallic objects from entering the VU-77 unit.
- Do not remodel or disassemble the unit. To do so is dangerous and damage may result.
- Do not damage the power cord as this could cause electrical shocks.
- Remove the AC power cord from the AC outlet when you are not using the unit for a long period.

If malfunctioning occurs, discontinue using the unit immediately, unplug it from the AC outlet and consult your local AKAI dealer.

- Do not position the unit vertically or upside down.
- Do not subject the unit to shocks. Exercise special care while carrying it.
- Do not carry the unit while it remains attached to the recorder. Be sure to disconnect it from the recorder to avoid any possible danger.
- Avoid using the unit under the following conditions:
  - Extremely hot or cold places
  - Places subject to excessive humidity
  - Places subject to excessive vibrations

Maintenance

To clean the cabinet, wipe with a soft cloth. Do not use thinner or benzine, as these may damage the surface finish of the cabinet or blur the timer display. If the cabinet becomes extremely dirty, first wipe with a soft cloth soaked in a diluted neutral cleaning agent and then apply a dry cloth.

1-3. SPECIFICATIONS

GENERAL

POWER REQUIREMENT	110/127/220/240V~, 50/60 Hz
POWER CONSUMPTION	55 watts
WEIGHT	6.0 kg
DIMENSIONS	274(W) x 103(H) x 304(D) mm
TEMPERATURE	
OPERATING	0° to 40°C
STORAGE	–20°C to 60°C

TUNER SECTION

CHANNEL COVERAGE	(EG)	VHF 2 – 4 (Band I) VHF 5 – 12 (Band III) UHF 21 – 69 (Band IV/V)
	(EK)	UHF 21 – 69 (Band IV/V)
	(S)	VHF A, B, C1, C (Band I) VHF 1 – 6 (Band III) UHF 21 – 69 (Band IV/V)
RF OUTPUT		Direct from the VP-77
VIDEO OUTPUT		1.0 Vp-p, 75 ohms
AUDIO OUTPUT		–14 dBs (open load)

TIMER SECTION

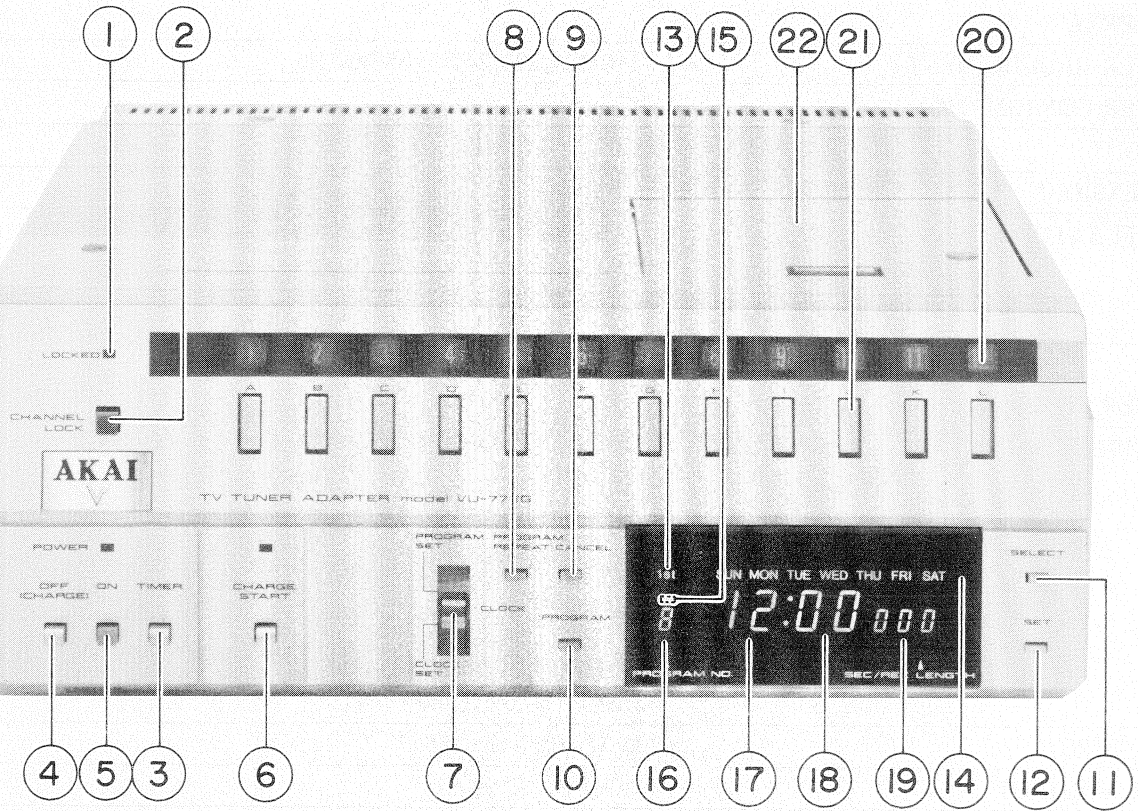
CLOCK/TIMER INDICATION	24-hour fluorescent digital indication
CLOCK REFERENCE	Quartz-locked
START TIME SETTING	Within 2 weeks
PROGRAMMING CAPACITY	8 programmes

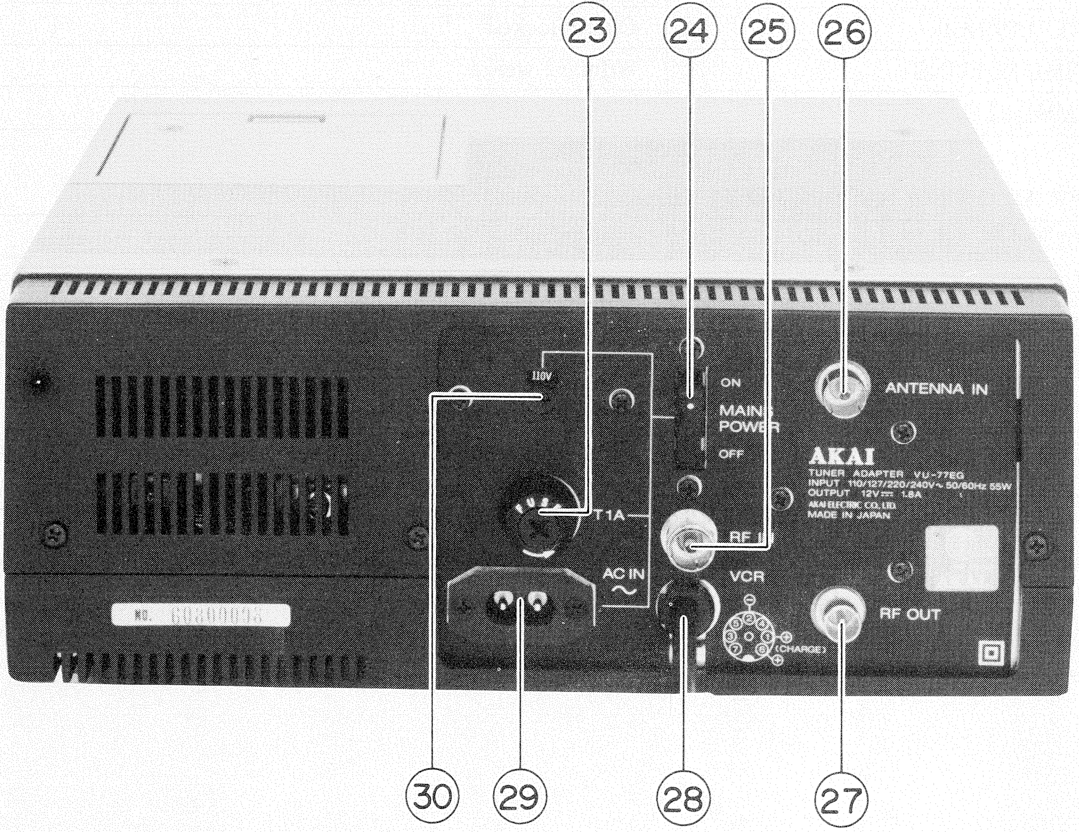
AC POWER ADAPTER/CHARGER SECTION

RATED OUTPUT VOLTAGE	12V DC ⎓
RATED OUTPUT CURRENT	Less than 1.8A (adapter mode)
BATTERY PACK TO BE CHARGED	Exclusive rechargeable battery pack, BP-N77
CHARGING INDICATOR	Provided
PROVIDED ACCESSORIES	Cable ass'y, Power cord Channel number indication film sheet Spacer x 4

Design and specifications subject to change without notice.

1-4. CONTROLS AND CONNECTORS


①
②
⑧
⑨
⑬
⑮
㉒
㉑
⑳
LOCKED
CHANNEL LOCK
AKAI
TV TUNER ADAPTER model VU-77EG
POWER
OFF (CHARGE)
ON
TIMER
CHARGE START
PROGRAM SET
PROGRAM REPEAT
CANCEL
CLOCK
CLOCK SET
PROGRAM
1st
SUN MON TUE WED THU FRI SAT
12:00 000
PROGRAM NO.
SEC/REC LENGTH
SELECT
SET
④
⑤
③
⑥
⑦
⑩
⑯
⑰
⑱
⑲
⑭
⑫
⑪


㉓
㉔
㉕
㉖
110V
ON
MAINS POWER
OFF
ANTENNA IN
AKAI
TUNER ADAPTER VU-77EG
INPUT 110/127/220/240V~ 50/60Hz 55W
OUTPUT 12V⎓ 1.8A
AKAI ELECTRIC CO., LTD.
MADE IN JAPAN
T1A
RF
AC IN ~
VCR
(CHARGE)
RF OUT
㉚
㉙
㉘
㉗

Front panel

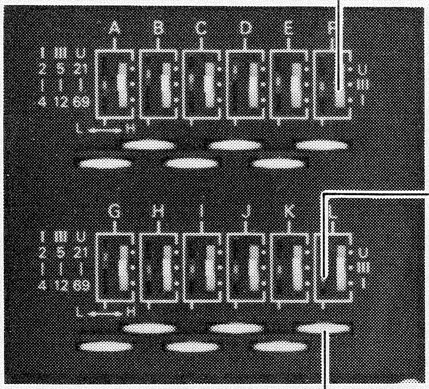
1. **Channel lock indicator**
   Lights when the CHANNEL LOCK button is pressed in, indicating that the selected channel has been locked so that touching the channel select buttons has no effect.
2. **CHANNEL LOCK button**
   When this button is pressed ON, the selected channel is locked so that it remains engaged even if any of the channel select buttons is touched by accident.
   In timer recording, the channel is locked automatically.
3. **TIMER record button**
   Press this button after you have set the recorder for unattended timer recording. With this button pressed in, the power is switched on and off at that time specified with the built-in timer.
4. **Sub-power OFF button**
   Press this button to switch off the power to the unit. Pressing this button has no effect on the clock section.
5. **Sub-power ON button**
   Press this button to apply power to the unit. When this button is pressed in, the LED indicator above the ON button lights.
6. **CHARGE START button**
   Press this button to apply power to the connected VP-77 recorder for recharging the installed rechargeable battery pack.
7. **Display function select switch**
   PROGRAM SET: Set to this position when you programme the timer by entering such data as the day of week, switch-on time, recording length and the channel from which you want to record.
   CLOCK: Leave the switch in this position after you have preset the timer and have set the clock to the correct local time, and the digital display shows the present local time.
   CLOCK SET: Set to this position when you adjust the clock for the day of week and the local time.
8. **REPEAT button**
   Press this button to enter the "repeat" command to record a serial TV show everyday or every week.
9. **CANCEL button**
   Press this button to cancel or "clear" the preset data after calling up the corresponding programme number on the display by pressing the PROGRAM number button (10).
10. **PROGRAM number button**
    Press to call up a programme memory on which the recording data are to be entered. Recoring data can be entered for each of 8 different programmes.
11. **SELECT button**
    Press to select the item for setting. In the Programme Set mode, the item for setting is switched every time this button is pressed in the order of Channel – Day – Hour – Minute – Recording length, repeatedly, and the corresponding portion of the display flashes. In the Clock Set mode, the item for setting is switched every time this button is pressed in the order of Second – Minute – Hour – Day, repeatedly, and the corresponding portion of the display flashes.
12. **SET button**
    In the Programme Set mode:
    For setting the channel, day, time and recording length. Holding it pressed continuously advances the indication rapidly.
    In the Clock Set mode:
    For setting the second, minute, hour and day. If held pressed, advances the indication rapidly except for the second indication, which holds at "00" for to-the-second clock setting.
13. **Week indicator**
    The indication "1st" or "2nd" will be illuminated for setting the data for making pre-programmed recordings.
14. **Day indicator**
    Both for constant day indication and day presetting for future recordings.
15. **Repeat indicator**
    When a certain scheduled programme is to be recorded repeatedly week after week or everyday indefinitely, the REPEAT button (8) is to be pressed.
    Then this indicator lights to indicate that the command for "repeat" has been memorized.
16. **PROGRAM NO indicator**
    Numerals 1 through 8 are successively displayed to show which programme is ready for entry. Programmes can be called up either for entry or for checking by pressing the PROGRAM number button (10) in the Programme Set mode.
17. **Hour digits**
18. **Minute digits**
19. **SEC/REC LENGTH (MIN) digits**
    A two-digit figure is displayed for counting the seconds in the Clock or Clock Set mode. On the other hand, in the Programme Set mode, three digits are displayed and a recording length can be set in minutes (settings in 5-minute increments up to 395).
20. **Channel indicators**
    Light when the corresponding button is pressed to show which channel has been selected for recording.
21. **Channel select buttons**
    Press the one which corresponds to the channel you want to record.
22. **Channel pre-tuning section**

Rear Panel

23. **FUSE holder**
24. **MAINS POWER switch**
    Switching ON applies power to the unit. To switch off the unit completely, set the MAINS POWER switch to OFF. This switches off the timer clock and cancels all preset programming data. This also switches off the built-in antenna circuit so that the TV receiver connected to the VU-77 will not be able to receive off-air TV programmes for good viewing condition. Normally set this MAINS POWER switch to ON.
25. **RF IN connector**
    Connect to the RF OUT connector of the VP-77.
26. **Antenna input terminal (ANTENNA IN)**
    Connect the antenna cable from the antenna.
27. **RF OUT connector**
    Connect to the antenna terminal of your TV receiver.
28. **VCR cord**
    Connect to the TUNER/AC ADAPTER connector of the VP-77 portable recorder. Same connection can be used to recharge a battery pack installed within the VP-77.
29. **AC input connector (AC ~ IN)**
    Connect the AC power cord to this connector.
30. **Voltage selector**
    The preset voltage is indicated in the window. If it differs from your local power supply voltage, reset it. See "POWER SYSTEM" on page 1-3.

Pre-tuning section (EG)

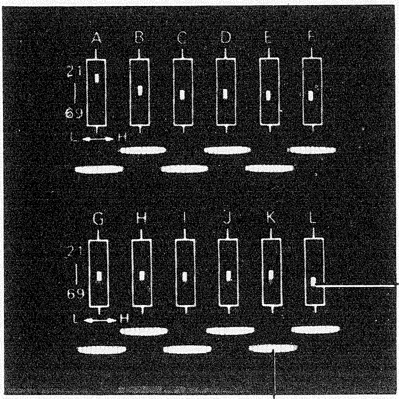
VHF/UHF band selector
I: For tuning to low VHF channels 2 through 4.
III: For tuning to high VHF channels 5 through 12.
U: For tuning to UHF channels 21 through 69.



Rough tuning indicator
Moves up or down by turning the corresponding tuning control to roughly indicate the station to which the corresponding channel selector is tuned.

Tuning control
Turn in either direction to tune in to a desired station.

Pre-tuning section (EK)

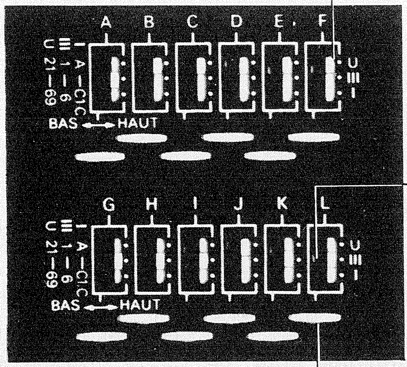

A B C D E F
21
69
L H
G H I J K L
21
69
L H

Rough tuning indicator
Moves up or down by turning the corresponding tuning control to roughly indicate the station to which the corresponding channel selector is tuned.

Tuning control
Turn in either direction to tune in to a desired station.

Pre-tuning section (S)

VHF/UHF band selector
I: For tuning to VHF channels (A, B, C1, C).
III: For tuning to VHF channels (1 through 6).
U: For tuning to UHF channels (21 through 69).


A B C D E F
I A—C1C
III 1—6
U 21—69
BAS HAUT
U
III
I
G H I J K L
I A—C1C
III 1—6
U 21—69
BAS HAUT
U
III
I

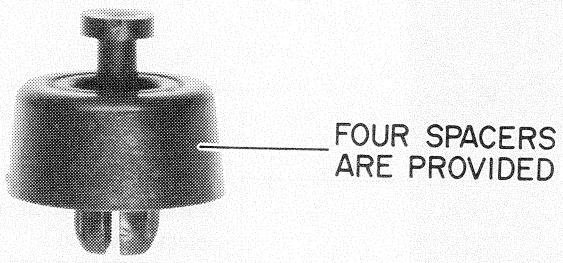
Rough tuning indicator
Moves up or down by turning the corresponding tuning control to roughly indicate the station to which the corresponding channel selector is tuned.

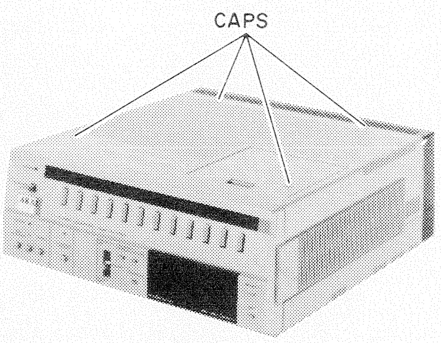
Tuning control
Turn in either direction to tune in to a desired station.

1-5. PLACING THE VP-77 AND THE VU-77 IN A STACK ARRANGEMENT

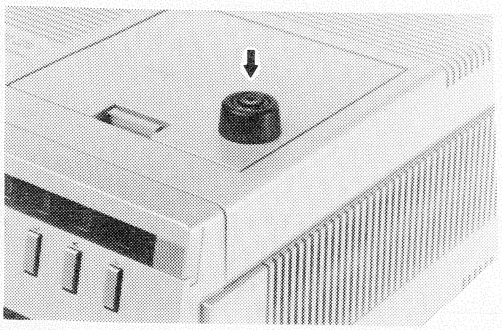
The VP-77 can be placed on top of the VU-77 in stack configuration for space saving installation.

- For this purpose, employ the four spacers provided.

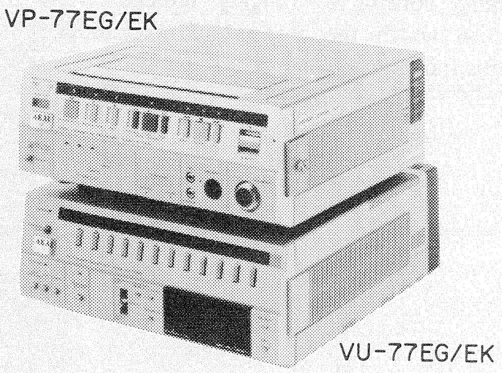




1. Remove the four caps on the top panel of the VU-77.



2. Insert the spacers into the holes from which the caps have been removed.

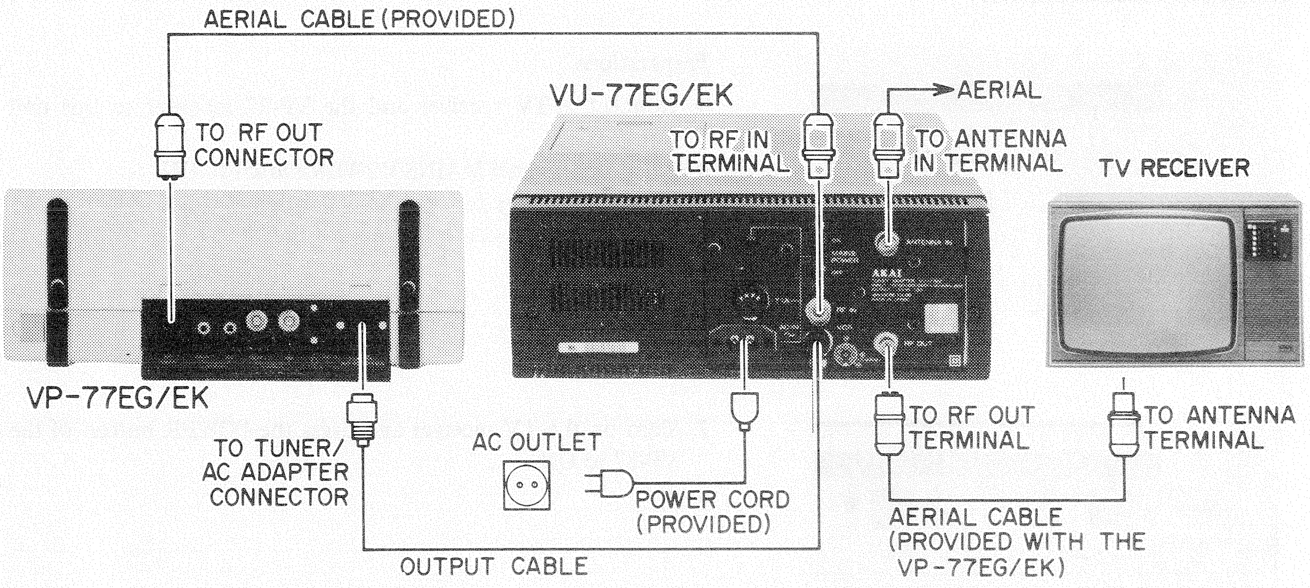


3. Position the VP-77 on the VU-77 squarely.

CAUTION

When using the VP-77 and the VU-77 in this stack configuration, be sure to use the provided spacers. Direct placement will obstruct heat ventilation from the VU-77, causing damage to the VU-77.

1-6. CONNECTIONS


AERIAL CABLE (PROVIDED)
VU-77EG/EK
AERIAL
TO RF OUT CONNECTOR
TO RF IN TERMINAL
TO ANTENNA IN TERMINAL
TV RECEIVER
VP-77EG/EK
TO TUNER/ AC ADAPTER CONNECTOR
AC OUTLET
TO RF OUT TERMINAL
TO ANTENNA TERMINAL
POWER CORD (PROVIDED)
AERIAL CABLE (PROVIDED WITH THE VP-77EG/EK)
OUTPUT CABLE

Using the VP-77 colour portable recorder

1. Disconnect the aerial cable from the TV receiver.
2. Re-connect it to the VU-77 as illustrated.
3. Connect the VU-77 to the TV receiver as illustrated.
4. Connect the VU-77 to the VP-77 using the aerial cable (provided) and the output cable of the VU-77.
5. Connect the power cord (provided) to an AC outlet.

Cables

Description	Connection	Availability
Aerial cable	Between VP-77 and VU-77.	Provided with the VU-77.
Aerial cable	Between VU-77 and TV receiver	Provided with the VP-77.

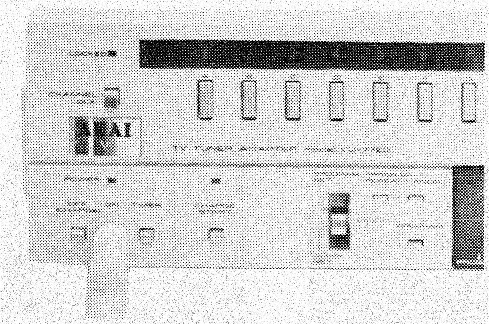
TV receiver adjustment

Your system is now ready to record off-air TV programmes onto the VP-77 and to play back the reccorded programmes. Since the aerial input is supplied to the TV receiver through the VU-77, you can also use the TV receiver in an ordinary way. The channel of the RF converter built into the VP-77 is preset to UHF channel 36. If channel 36 is employed for broadcasting, reset the converter channel to one of the vacant channels between 32 and 40 as follows:

1. Adjust the TV receiver channel to one of the vacant channels.
2. Connect a video camera to the VP-77 and switch the power on for the recorder.
3. While monitoring the camera signal on the TV screen, turn the screw at the RF converter channel select switch in either direction so that the monitored picture comes in most clearly.
   - It's possible to adjust the playback picture on the TV receiver using a prerecorded tape.
   - When you wish to view video cassette programmes, always set the TV receiver's channel selector to your VIDEO CHANNEL.
   - If you have already made adjustment of the RF converter in the VP-77, re-adjustment is not necessary.

1-7. PRE-TUNING

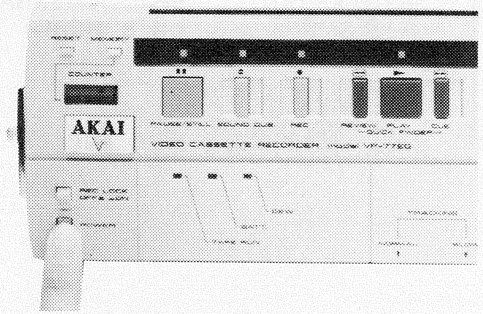
The tuning controls have been preset to predetermined channels prior to shipment. If you want to change these preset channels, proceed as follows:



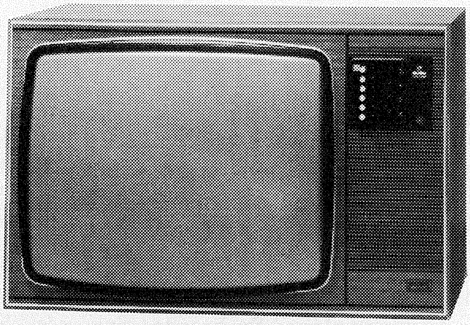
Preparations

- Connect a TV receiver and the VP-77 recorder to this unit (VU-77).
- Set the rear panel MAINS POWER switch to ON.
- Leave the display function select switch at CLOCK.

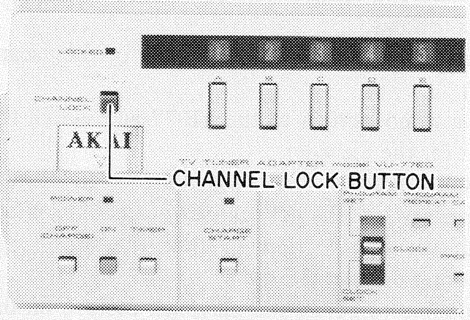
1. Press the sub-power ON button of the VU-77.



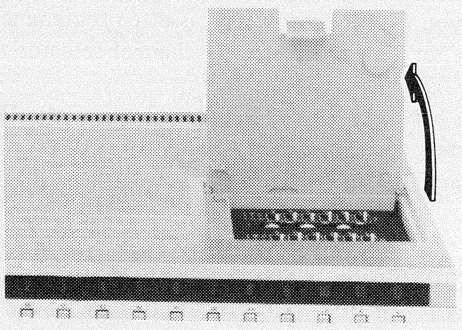
2. Turn on the TV receiver and press the POWER button of the VP-77 to ON.



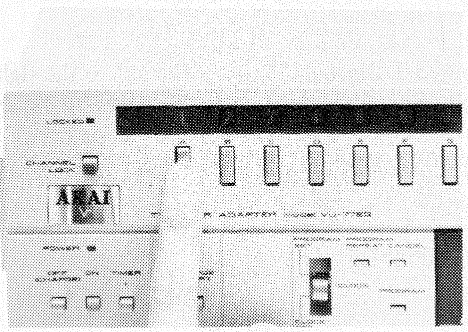
3. Set the TV receiver channel to the output channel of the RF converter built into the VP-77. (your video channel)



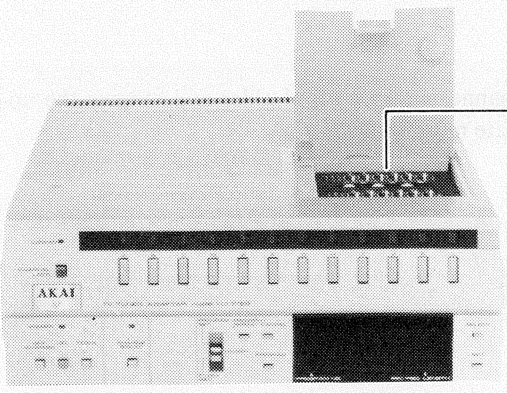
4. Make sure that the CHANNEL LOCK indicator does not light.
   - If it lights, press the CHANNEL LOCK button for OFF.
   - Make sure that the display function select switch is set to CLOCK.



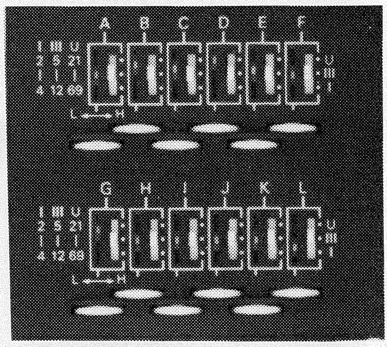
5. Lift up the lid of the pre-tuning control section.



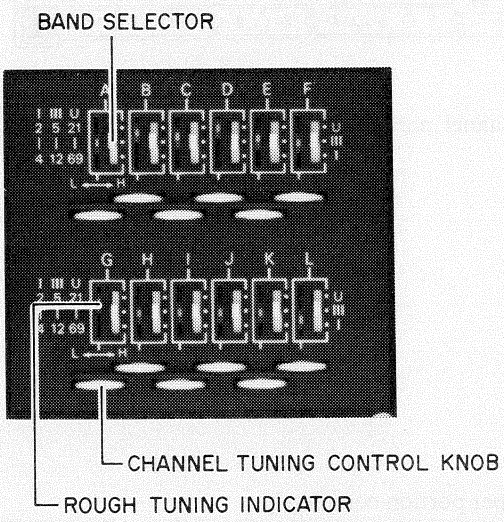
6. Press the channel select button which you've chosen to allocate for the station to be pre-tuned in. The corresponding channel indicator will illuminate.
   - The channel select buttons and the tuning control knobs are labelled with corresponding alphabetical letters to facilitate identifying each pair.



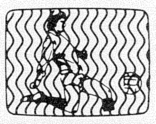
To make a tuning for the A channel select button, turn the A tuning control knob. The same applies for B, C, D . . . .


A B C D E F
I III U
2 5 21
4 12 69
L → H
G H I J K L

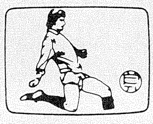
PRE-TUNING CONTROL SECTION


BAND SELECTOR
A B C D E F
I III U
2 5 21
4 12 69
L → H
G H I J K L
CHANNEL TUNING CONTROL KNOB
ROUGH TUNING INDICATOR

7. Set the VHF/UHF band selector as required.
   - Set to I when tuning in to low VHF channels 2 through 4.
   - Set to III when tuning in to high VHF channels 5 through 12.
   - Set up U when tuning in to UHF channels 21 through 69.
8. Tune in to a desired station by turning the corresponding tuning control knob while observing the TV screen.
   - Turning the tuning control in either direction moves the rough indicator vertically.
9. To obtain the best possible picture, make further adjustments.



Striped picture

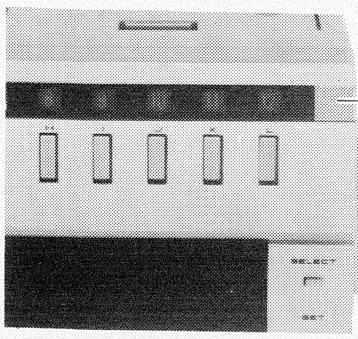


Clear picture

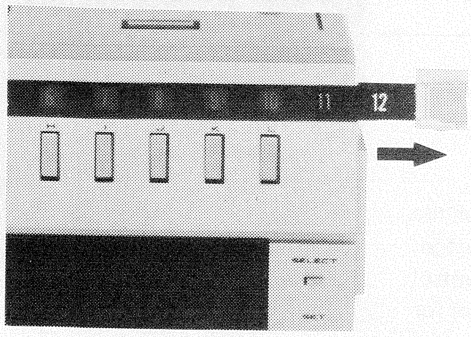
   - Turn the tuning control knob first until you get the striped picture, and then slowly turn, little by little, to clear up the picture.
10. Perform the same adjustments, steps 6 through 9, for each of the other channels. After completion of all necessary adjustments, close the lid of the pre-tuning control section.

1-8. REPLACING THE CHANNEL NUMBERS

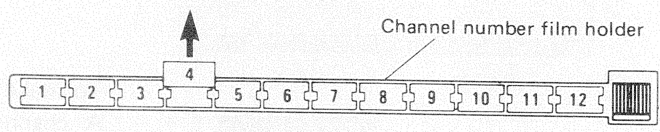
Prior to shipment, the channels on the channel indicator panel are numbered 1 through 12 from the left to the right. If you have changed the preset channels, replace the channel numbers in the following manner:

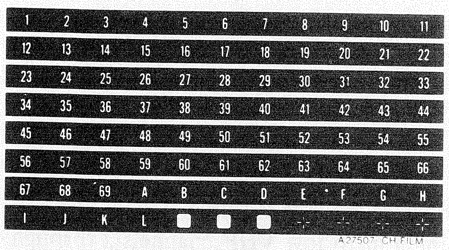

Channel number film holder
SELECT
SET

1. Disengage the stopper portion of the channel number film holder.

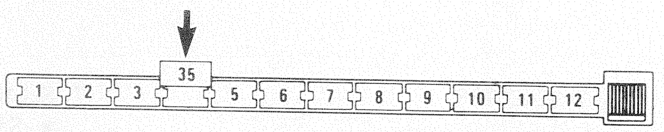

11
12
SELECT
SET

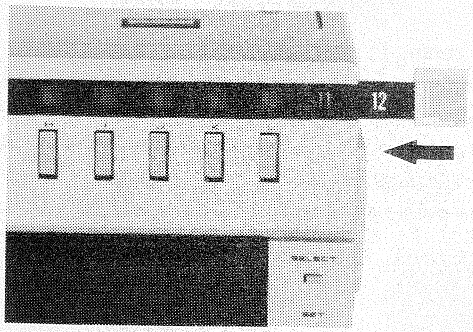
2. Pull out the channel number film holder and remove the no-longer-appropriate number film.


Channel number film holder
1
2
3
4
5
6
7
8
9
10
11
12

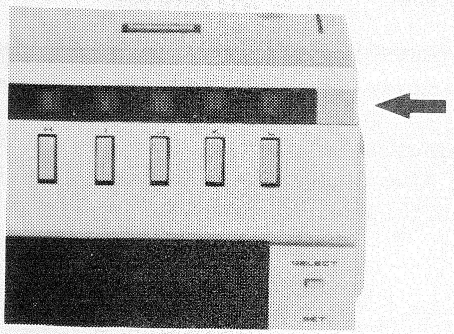

1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41 42 43 44
45 46 47 48 49 50 51 52 53 54 55
56 57 58 59 60 61 62 63 64 65 66
67 68 69 A B C D E F G H
I J K L
A27507 CH FILM

3. Separate the appropriate number film from the provided channel indicator film sheet by twisting it. Insert it into the channel number holder.


35
1
2
3
5
6
7
8
9
10
11
12

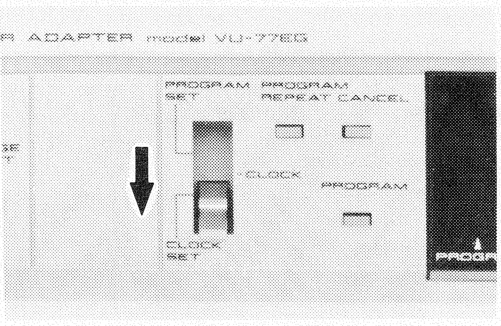

11
12
SELECT
SET

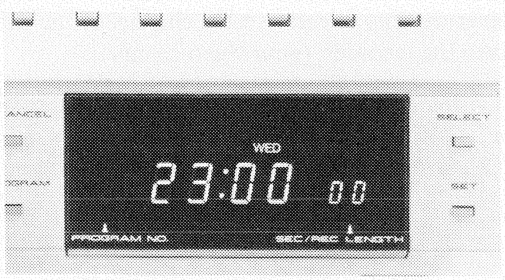
4. Reinsert the channel number holder so that the numbers are clearly visible.



5. Engage the stopper portion completely.

1-9. CLOCK SETTING





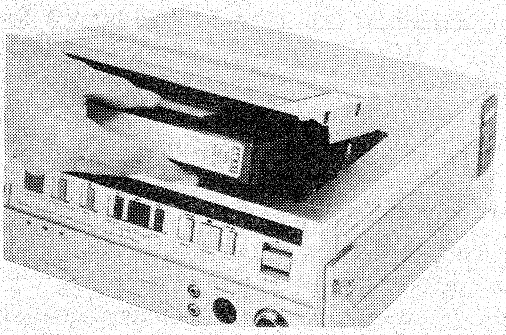
When the VU-77 is plugged into an AC outlet and the MAINS POWER switch is set to ON, the display shows a flashing SUN 0:00 00. The same state appears after a power failure has occurred. When the display function select switch is set to CLOCK SET, the built-in timer clock starts time-keeping.

Setting to the correct day and time

1. Set the display function select switch to CLOCK SET.
   - The "second" digits will start counting while flashing.
2. Press the SELECT button, and then the minute digits will start flashing.
3. Press the SET button until the correct minute indication is displayed.
   - It is recommended that you obtain a minute indication one minute ahead of the correct local time for the purpose of later making a to-the-second setting.
4. Press the SELECT button, and then the hour digits will start flashing.
5. Press the SET button until the correct hour indication is displayed.
6. Press the SELECT button, and then the SUN will start flashing.
7. Press the SET button until the correct day is displayed.
8. Press the SELECT button, and then the second digits will start flashing.
9. Hold the SET button pressed, and the seconds will be reset to and held at "00".
10. Release the button at the exact instant of the time signal, and the timer clock will be set accurately to the present time.
11. Return the display function select switch to CLOCK.

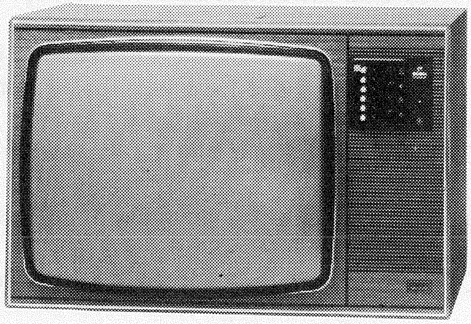
- This timer uses the 24-hour time indication.
- Holding the SET button pressed for more than 1 second continuously advances the day, hour or minute indication automatically. Pressing it once advances the indication in single increments only.
- To re-adjust the clock (for a slight increase or reduction), set the display function select switch to CLOCK SET and press the SET button. The seconds from 0 to 29 seconds will be reset to "00" and that from 30 to 59 seconds will be reset to "(+1):00".
- If a power failure should occur (and last longer than about 10 minutes), not only time-keeping stops, but also all the preset data will be cancelled. A flashing SUN 0:00 00 indicates this after power has been reapplied. In such cases, first correct the time indication and then re-enter the programming data.
- The clock/timer memory hold system uses two "R6" rechargeable batteries having a back-up time of about 10 minutes after being charged for 48 hours.

1-10. RECORDING TV PROGRAMMES

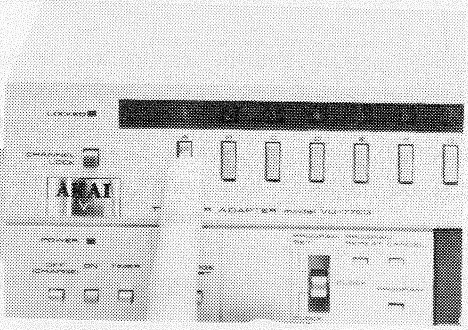


- Connect the TV receiver and the VP-77 to this unit (VU-77). (Refer to page 1-11 for further details.)
- Turn all power switches to ON for each unit.

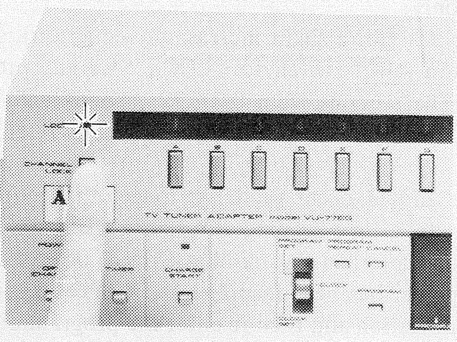
1. Load a video cassette into the recorder.



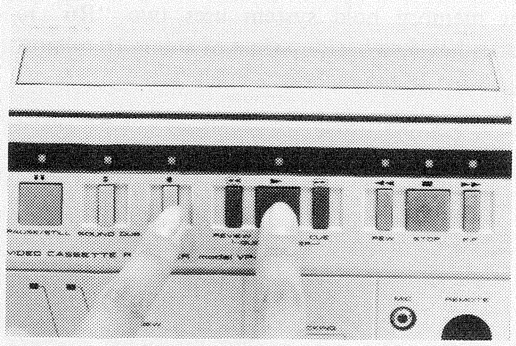
2. Set the TV receiver channel selector to the channel of the RF converter built into the recorder. (your video channel).



3. Press the channel select button corresponding to the programme which you wish to record.



4. Press the CHANNEL LOCK button to ON.
   - The channel lock indicator will light to show that the selected channel is "locked" so that it remains engaged irrespective of accidental touching of the channel select buttons.



5. Press the REC and PLAY buttons of the recorder simultaneously.
   - Recording of the selected TV programme will start and at the same time the picture will appear on the TV screen.

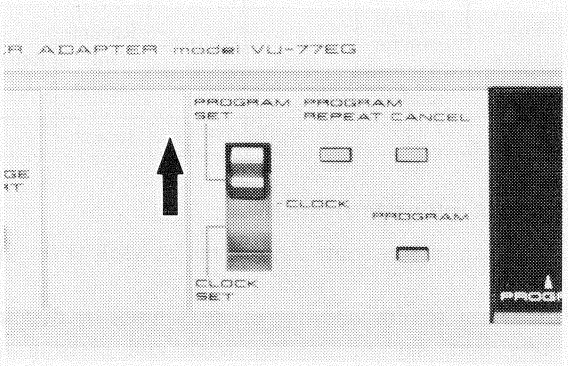
To record one TV programme while watching another

Set the VU-77 for recording one TV programme in the same manner described in steps 1 through 5 and set the TV receiver channel selector to any other channel you wish to view.

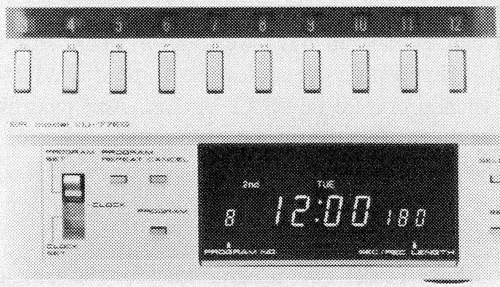
1-11. TIMER RECORDING

To built-in 14-day programmable timer permits recording of preset channels on preset days, at preset times for preset lengths while you are away. First set the clock and then preset the programmable timer before finally operating the recorder section for unattended recording. The basic procedure to remember for presetting the timer is to call up a programme number among 1 through 8 and enter the programming data with the SELECT and SET buttons.

1. Load a cassette whose tape length is sufficient for the total time of your intended recordings.
2. Set the display function select switch to PROGRAM SET.



You will see "1" in the bottom left corner of the display. Now you are ready to preset the timer for programme "1". No. 1 is always called up first. If you wish to change the programme number, press the PROGRAM button.



3. Press the SET button until the desired channel numeral flashes.
   - The flashing channel is the one which will be recorded at a preset time.
4. Press the SELECT button, and then the next item for setting – day – will start flashing.
5. Press the SET button until the desired day – or all the days of the week (which appear after 2nd Saturday), if you wish to record a programme every day at the same time – is displayed.
6. Press the SELECT button, and then the next item for setting – hour – will starting flashing.
7. Press the SET button to obtain a desired hour indication.
8. Press the SELECT button, and the next item for setting – minute – will start flashing.
9. Press the SET button to obtain a desired minute indication.
10. Press the SELECT button, and the next item for setting – recording length – will start flashing.
11. Press the SET button to obtain a desired recording length in minutes.
12. Set the display function select switch to CLOCK.
13. You have now completed presetting of the programmable timer. For unattended recording to take place:
    - Make sure that the safety tab of the cassette is in place.
    - Press the POWER button of the VP-77 to ON.
    - Press the TIMER button.
    - When the preset switch-on time is reached, recording will start automatically.
    - There is no need to press the REC and PLAY button of the VP-77.

Repeating the preset programmes

- Normally the preset data are cleared after a recording has been made accordingly. However, if you wish to hold the preset data in memory in order for recordings to be made repeatedly according to this same data (for example, at the same time on the same day every week), press the REPEAT button. The programme repeat indicator will light.

Cancelling the preset programmes

- The preset programmes can be cancelled by pressing the CANCEL button after calling up the corresponding programme number on the display.
- If you wish to cancel all preset data for programmes 1 through 8, press the CANCEL button while simultaneously holding the PROGRAM button. Then all programmes will be cleared and programme No. 1 will be displayed.
- Cancelling of the programming data is impossible if the TIMER button has been pressed in.

NOTES:

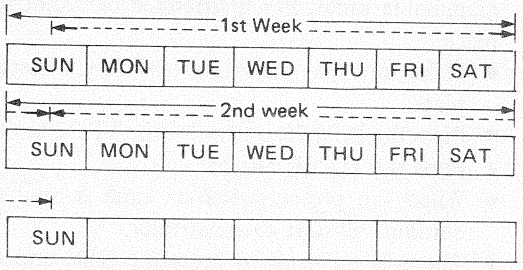
- The preset data can be called up at any time for checking by engaging the Programme Set mode and calling up the relevant programme number.
- If you wish to change the preset data partially, press the SELECT button in the Programme Set mode until the corresponding item start flashing on the display and enter the new data by pressing the SET button.
- If a power failure should occur (and last longer than 10 minutes), not only time-keeping stops, but also all the preset data will be cancelled. (See page 1-4.) A flashing SUN 0:00 00 indicates this after power has been reapplied. In such cases, first correct the time indication and then reenter the programming data.
- Tape loading starts 10 seconds before the preset switch-on time and recording starts at the preset time.

1-12. FOR A BETTER UNDERSTANDING OF THE PROGRAMMABLE TIMER

Two-week timer

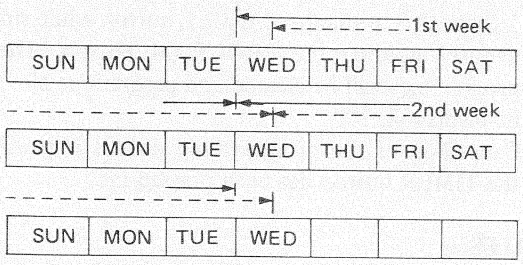
"Two-week" presetting capacity means that you can "reserve" recordings on any one of 14 days in advance including the day of setting.

If the current day of setting is Sunday:



- In this situation, there may be no possibility of confusion in setting the day.
- Namely, the "1st MON" is Monday of the current week and the "2nd MON" is Monday of the next week. The same applies to other week days.
- Regarding Sunday, there are two different cases; one is that you are going to set the timer to a time before the current time of setting and the other is that the preset time is a time after the current time of setting.
- In the former case, the "1st SUN" is the next Sunday and the "2nd SUN" is the Sunday after next.
- In the latter case, the "1st SUN" is the current Sunday and the "2nd SUN" is Sunday of the next week.

If the current day of setting is Wednesday for example:



- Remember that the "1st MON", "1st TUE" and so on . . . mean the first coming Monday, the first coming Tuesday, and so on, and net Monday of the current week.
- Similarly, the "2nd MON", "2nd TUE" and so on . . . are the second coming Monday, the second coming Tuesday, and so on, and not Monday or Tuesday of the next week.
- If you are on Wednesday for example, and wish to record something on Tuesday of the next week, the preset data should be "1st TUE". To record on Thursday of the next week, set "2nd THU".
- Regarding Wednesday, the same as mentioned about Sunday on the left applies.

8-programme timer

"8-programme" presetting capacity means that you can have 8 separate programme entries which contain different programming data. Because of this capacity, you can even "reserve" 8 different TV programmes, either on the same day or on different days.
Each programme (No. 1 through No. 8) entry contains information on "TV programme channel number", "day", "switch-on time", "recording length" and "either single or repeat".

Example of the contents of one programme entry:

Programme number	TV programme channel number	Day	Switch-on time	Recording length	Repeat
2	12	1st WED	2:30	30 min.	–

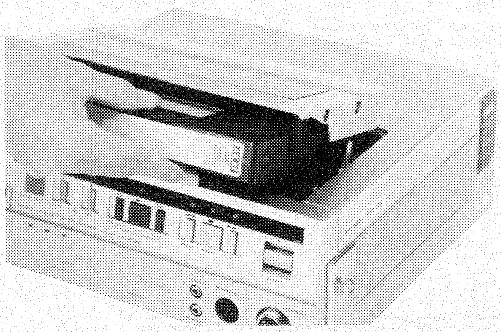
Variety of setting possibilities

- You can set for some day of the 1st week or the 2nd week.
- You can set for one day of every week by first setting that day of the 1st week and pressing the REPEAT button.
- You can set for one day of every week starting from the second week by first setting that day of the 2nd week and pressing the REPEAT button.
- You can set for all days of the 1st week. For this setting, obtain the indication "1st SUN MON TUE WED THU FRI SAT", and recordings will be repeated at the same time everyday for one week.
- You can set for all days week after week. For this setting, first obtain the indication as mentioned above and then press the REPEAT button. And recordings will be made everyday week after week.
- All the above applies for all 8 programme entries.

Programme priority

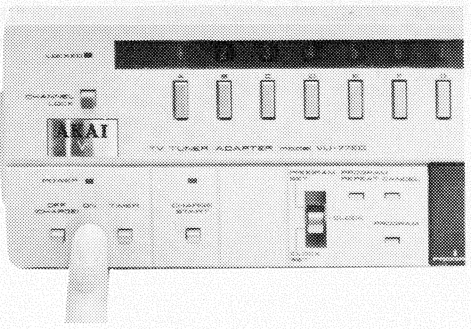
- If you have preset two programmes for the same day and the same switch-on time, the setting corresponding to the smaller programme number has priority.
- If two programmes have preset times which overlap, the earlier-started programme will be interrupted by the latter one.
- It is impossible to alter the programmed data (except the recording length) during actual timer recording.
- The recording length can be changed even during timer recording by using the SELECT and SET buttons in the Programme Set mode.

1-13. PLAYBACK

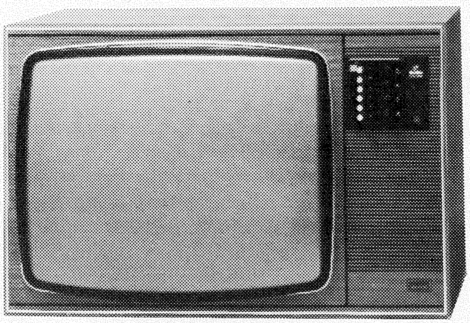


- Connect a TV receiver and the VP-77 to this unit (VU-77).

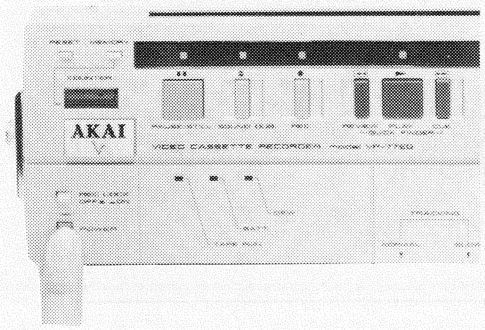
1. Load a pre-recorded cassette into the recorder.



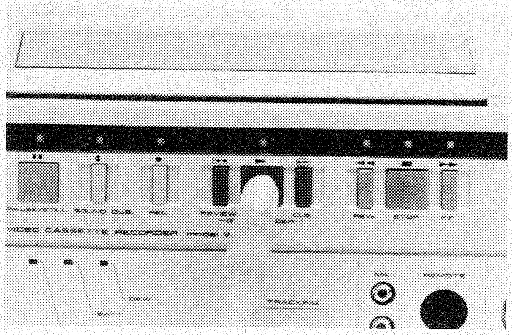
2. Press the sub-power ON button of this unit.



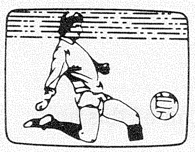
3. Set the TV receiver channel selector to the same channel of the RF converter in the recorder.



4. Press the POWER button of the recorder to ON.



5. Press the PLAY button of the recorder.
   - Playback of the recorded material will start and the picture will appear on the TV screen.



NOTE:

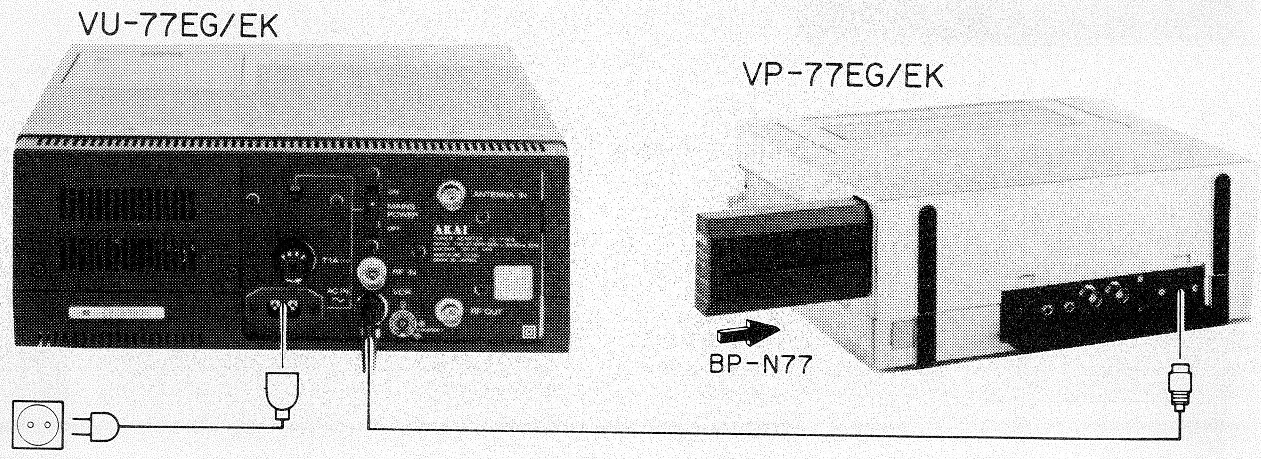
If the playback picture contains noise bars . . . .

Is the TRACKING NORMAL control of the recorder properly adjusted? Turn the knob to centre until a click is heard. If noise bars still appear, turn the knob slowly in either direction until they move out of the screen. Recording should always be done with this control returned to centre.

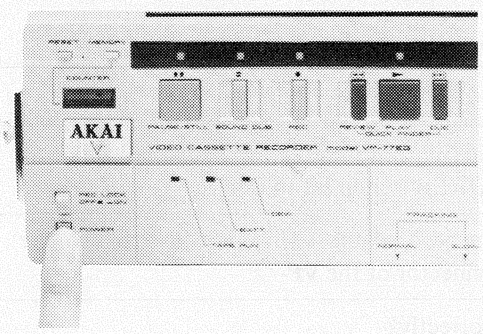
1-14. RECHARGING THE BATTERY PACK (BP-N77)

The VU-77 can serve as a recharging unit for the rechargeable battery pack, BP-N77, when it is installed within the VP-77 recorder.

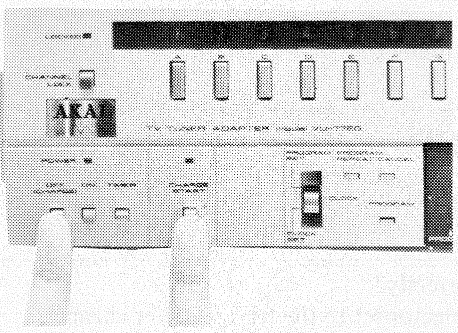
Connections



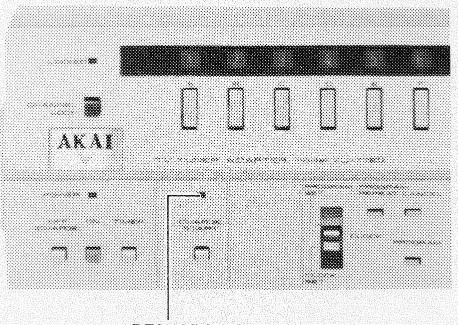
- Install the battery pack BP-N77 into the VP-77.
- Press the front panel sub-power OFF button of the VU-77 when making this connection.
- While recharging, the recorder cannot be operated.



1. Set the recorder to the Stop mode and the POWER button to OFF.



2. Press the sub-power OFF button of the VU-77. Then press the CHARGE START button of the VU-77.
   - ● Recharging will start now with the indicator lighting.



3. Upon completion of recharging, the recharging indicator will go out.

To prevent moisture condensation

The VU-77 incorporates a power supply for the moisture condensation prevention heater which is built into the VP-77.

- ● If the POWER button of the VP-77 is set to OFF and the sub-power OFF button of the VU-77 is pressed, the moisture condensation prevention heater inside the VP-77 is powered. However, if for some reason you are not using the VP-77 for a long period of time, it is advisable to remove the power cord of the VU-77 from the AC outlet.

1-15. IN CASE OF DIFFICULTY

Symptoms	Check points
No power is applied to the VU-77.	● Is the power cord connected? ● Is the rear panel MAINS POWER switch set to ON?
No power is applied to the VP-77.	● Make sure that the output cord of the VU-77 is connected to the TUNER/AC ADAPTER connector of the VP-77.
Recording is impossible.	● Are all connections made correctly? – See page 1-11. ● Is the safety tab of the cassette is place? – If not, reseal the slot. ● Is the right procedure being followed? – See page 1-16.
Timer recording is impossible.	● Has the timer been correctly set? – See page 1-17. ● Has the right procedure been followed? – See page 1-17.
Playback is impossible.	● Are all connections made correctly? ● Is the TV receiver channel selector set to the RF converter channel? ● Is the operating procedure accurately followed? – See page 1-19.
Channel cannot be swithed.	● Is the CHANNEL LOCK button pressed in? – If so, release the button. ● Is the TIMER button pressed in? – If so, press the ON button. ● Is the display function switch set to CLOCK SET or PROGRAM SET? – If so, set the switch to CLOCK.

SECTION 2

DISASSEMBLY

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2-1. EXTERNAL COVERS 2-2
2-2. MAIN PARTS LOCATION 2-3

2-1. EXTERNAL COVERS

1. Take out 3 screws ① shown in Fig. 2-1. Carefully raise the rear of the top cover and remove the top cover.
   When replacing, open the pre-tuning cover and use care that the top cover does not contact the presetter.

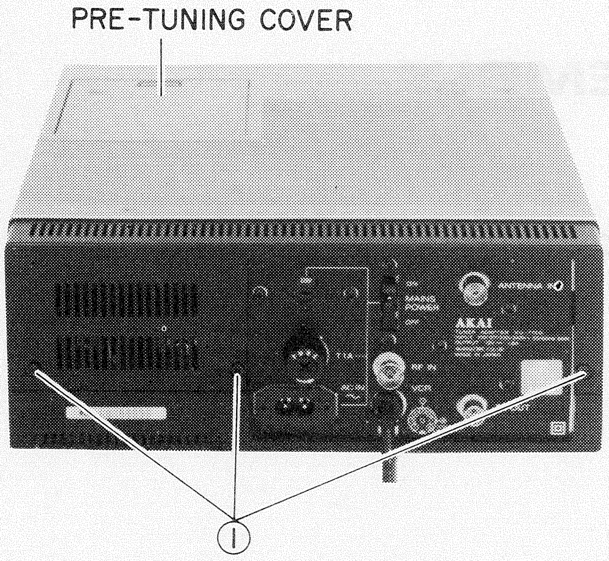

Fig. 2-1 Top cover

2. Take out 4 screws ② shown in Fig. 2-2 and remove the bottom cover.

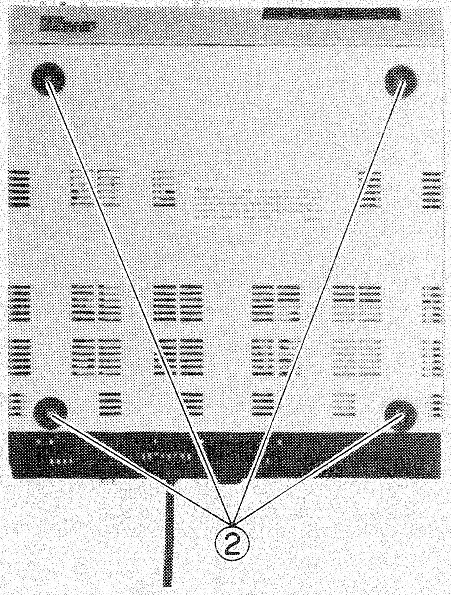

Fig. 2-2 Bottom cover

3. Take out 2 screws ③ shown in Fig. 2-3 and while using care regarding stud ④, remove the front cover assembly.
4. Take out 5 screws ⑤ shown in Fig. 2-4 the position the front cover at the bottom. While using care that the knobs etc. do not fall loose, remove the Function & Display board.

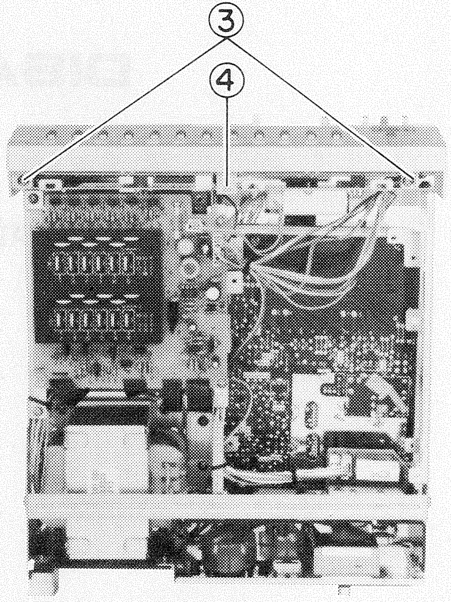

Fig. 2-3 Front cover ass'y

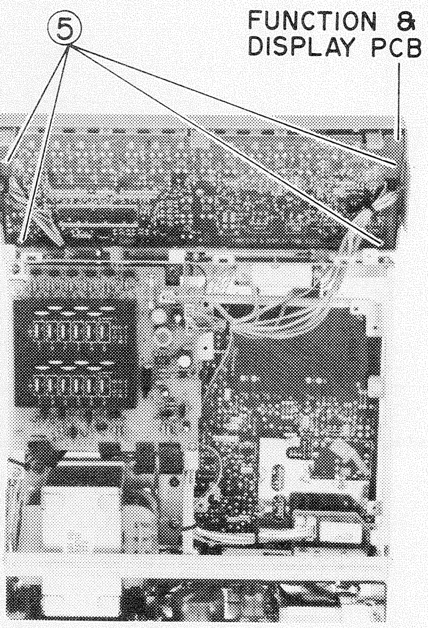

Fig. 2-4 Function & display board

2-2. MAIN PARTS LOCATION

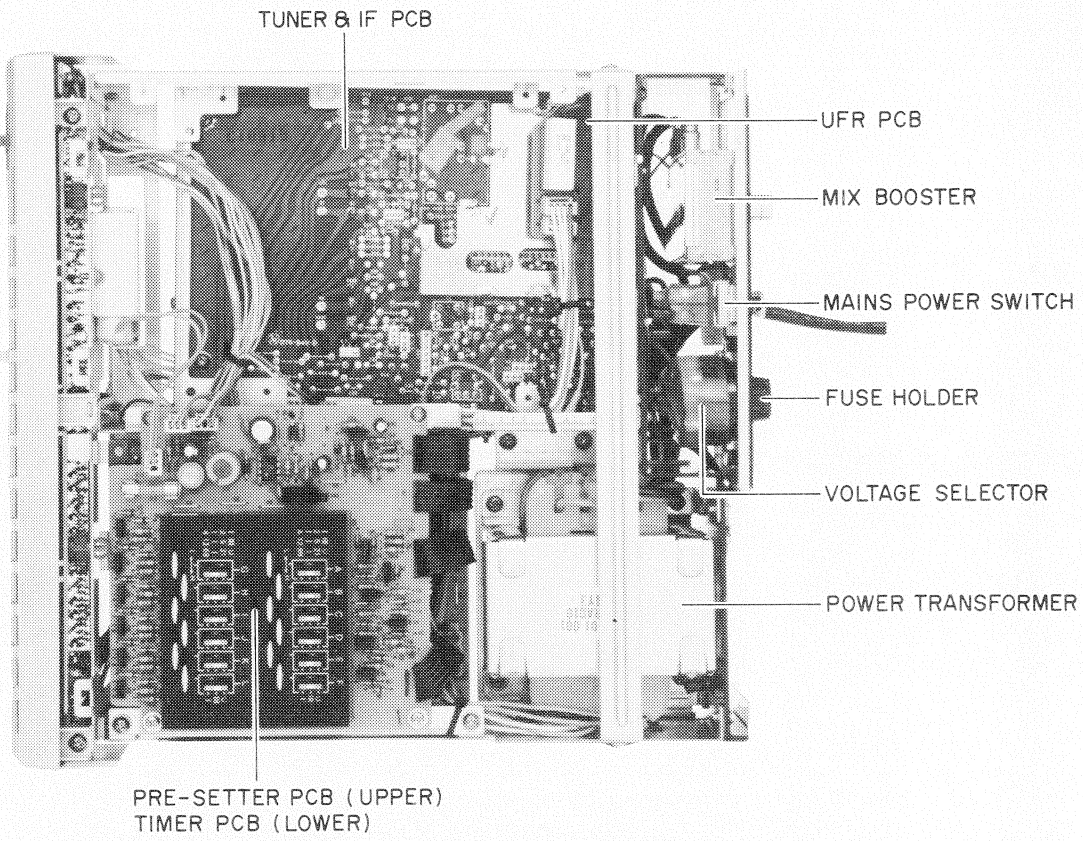
TUNER & IF PCB
UFR PCB
MIX BOOSTER
MAINS POWER SWITCH
FUSE HOLDER
VOLTAGE SELECTOR
POWER TRANSFORMER
PRE-SETTER PCB (UPPER)
TIMER PCB (LOWER)

Fig. 2-5(a) Top view

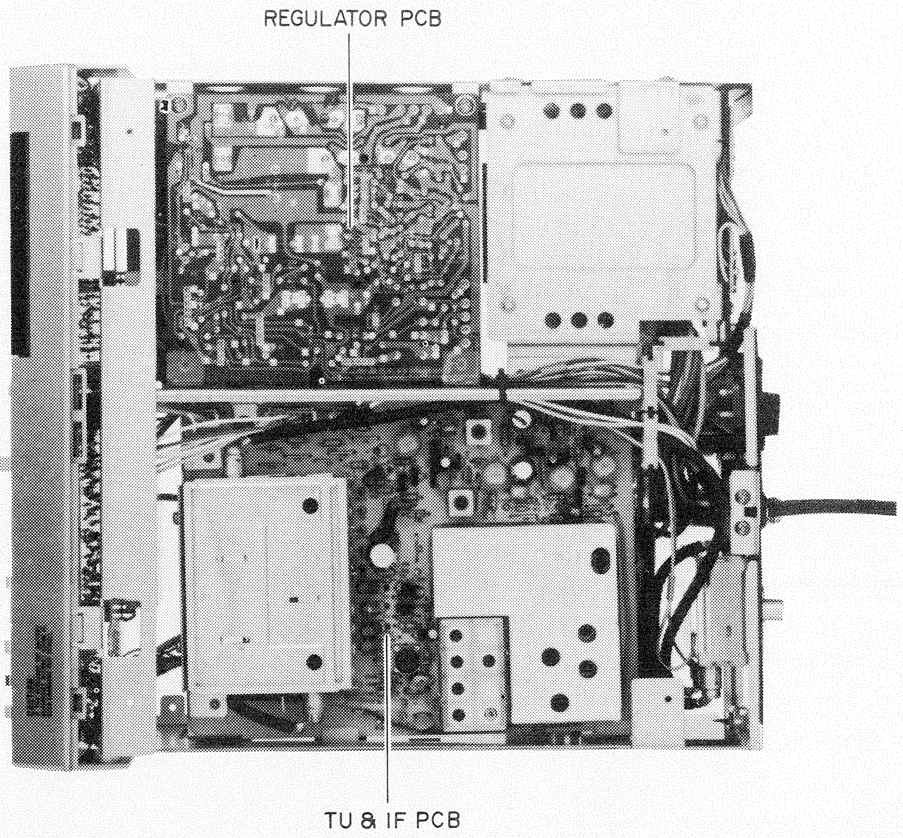
REGULATOR PCB
TU & IF PCB

Fig. 2-5(b) Bottom view

SECTION 3

ADJUSTMENT PROCEDURE

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3-2B. TUNER & IF CIRCUIT (S) 3-5
3-3. CHECKS AND ADJUSTMENTS FOR BACK-UP 3-7
3-4. CHECK AND ADJUSTMENTS FOR PROGRAMMABLE TIMER AND DISPLAY 3-7

3-1. REGULATOR CIRCUIT

1. 12V DC
   1) Disconnect the 7-pin output connector from the VP-77.
   2) Connect a digital voltmeter or a DC voltmeter to the 6-pin terminal of the 7-pin output connector or terminal 35 of the regulator board.
   3) Adjust R9 to obtain a DC output voltage of 12.5 ± 0.2V.

2. AL 12V DC
   1) Connect a digital voltmeter or a DC voltmeter to terminal 63.
   2) Confirm a DC output voltage of 12.0 ± 0.5V.

3. 10V DC
   1) Connect a digital voltmeter or a DC voltmeter to terminal 52.
   2) Confirm a DC output voltage of 10.5 ± 0.2V.

4. 40V DC
   1) Connect a digital voltmeter or a DC voltmeter to terminal 72.
   2) Confirm that the DC output voltage is 41 ± 3V.

5. Battery charging voltage
   1) Insert uncharged battery pack BP-N77 into the VP-77.
   2) Turn off the POWER switches of the VU-77 and VP-77.
   3) Connect the 7-pin output cable to the VP-77.
   4) Connect a digital voltmeter or a DC voltmeter to terminal 32.
   5) Press the CHARGE START switch of the VU-77.
   6) Confirm that the DC output voltage is more than 16V.
   7) At this time, check that the recharging indicator of the VU-77 lights.

6. Others

   Observe that R101 to R104 of UFR circuit board are not in contact with one another.

3-2A. TUNER & IF CIRCUIT (EG/EK)

1. BM voltage
   1) Connect a digital voltmeter or a DC voltmeter with the tuner BM terminal of the Tuner & IF circuit board.
   2) Check for 15.5 ± 0.5V.

2. Required test equipment
   1) Sweep generator (with marker)
      VIF: 38.9 MHz (EG), 39.500 MHz (EK)
      SIF: 5.5 MHz (EG), 6.0 MHz (EK)
   2) Alignment scope (or Oscilloscope)
   3) Audio level generator
   4) Frequency counter (at least 50 MHz, sensitivity min. 10 mV)
   5) RF test signal (Band III Color Bar)
   6) DC power supply (for AGC bias)
   7) Spectrum analyzer (required for AFC adjustment)
   8) VIF and SIF adjustment probes (Fig. 3-1A)
   9) Shorting clip for detector transformer (Fig. 3-2A)

   The above equipment is required for Tuner & IF Board adjustments.

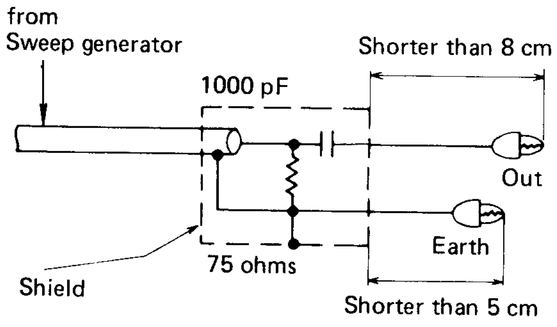


Fig. 3-1A Sweep signal supply cable

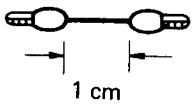


Fig. 3-2A Shorting clip

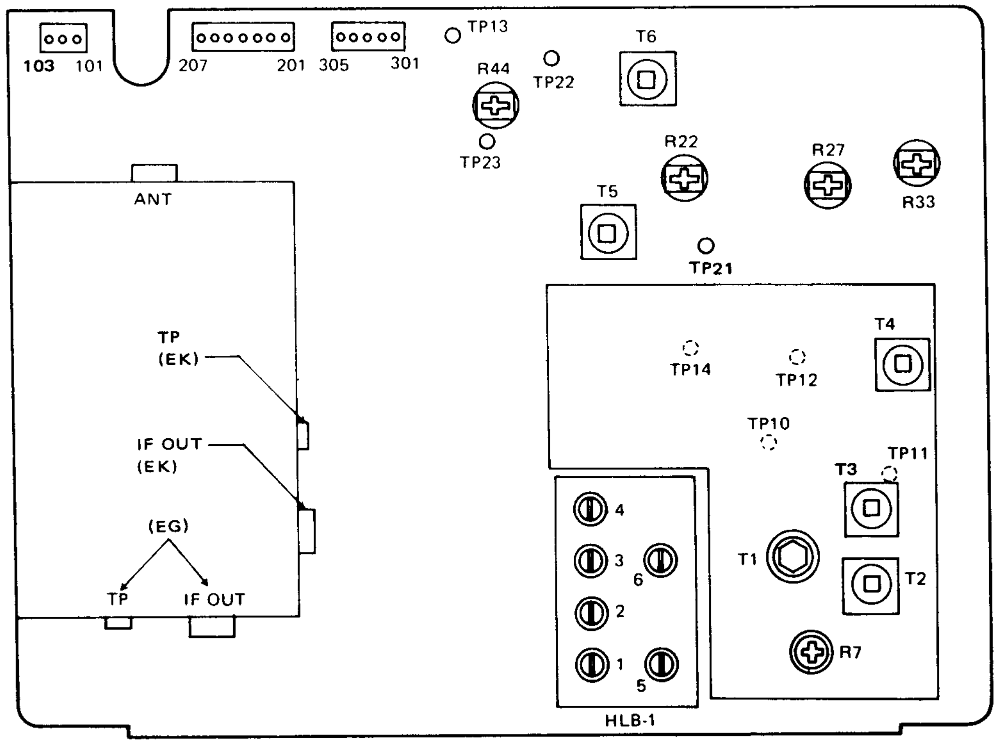

103
101
207
201
305
301
TP13
T6
R44
TP22
TP23
R22
R27
R33
ANT
T5
TP21
TP
(EK)
IF OUT
(EK)
(EG)
TP
IF OUT
T4
TP14
TP12
TP10
TP11
T3
4
3
6
2
1
5
T1
T2
R7
HLB-1

Fig. 3-3A Tuner & IF board

3. Sound carrier trap
   1) Set sweep/marker generator output for 25 dB.
   2) Connect the generator output to IC1 pin 1 (HLB OUT).
   3) Connect a DC power supply to TP14. When connecting, first connect the ground lead, then the "hot" lead (reverse this when disconnecting). Apply AGC voltage; adjust the DC voltage so that sound trap adjustment becomes easily performed with reference to the alignment scope (or oscilloscope), i.e., set for 6 to 7V AGC voltage and expand the waveform. Connect scope to TP12.
   4) Adjust transformer T1 for minimum 33.4 MHz (EG), 33.5 MHz (EK) trap in the observed waveform.

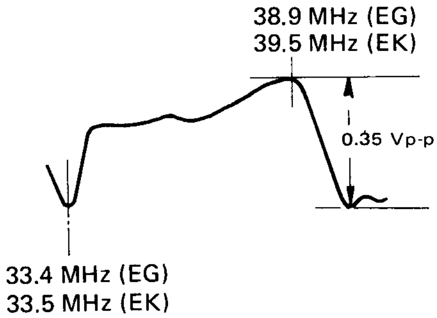

38.9 MHz (EG)
39.5 MHz (EK)
0.35 Vp-p
33.4 MHz (EG)
33.5 MHz (EK)

Fig. 3-4A Sound carrier

4. Detector transformer (T3)
   1) In the same condition as above, set the generator output for 35 dB.
   2) Adjust AGC voltage for detector output of 0.35 Vp-p at TP12.
   3) Observe oscilloscope and adjust the detector transformer (T3) for peak at the 38.9 MHz (EG), 39.5 MHz (EK) marker of the waveform.

5. VIF waveform
   1) Set the generator for 45 dB output.
   2) Connect generator probe to tuner test point (see Fig. 3-3A).
   3) Short TP10 and TP11.
   4) Apply external AGC voltage to TP14 and connect oscilloscope to TP12.
   5) Vary the AGC voltage and adjust HLB core 5 to minimize the 40.4 MHz (EG), 41.5 MHz (EK) pulse marker.

   NOTE: Avoid disturbing HLB cores 2, 3 and 6 (these do not require adjustments).

   6) Adjust the AGC voltage for VIF waveform of 1 Vp-p at TP12.
   7) Adjust HLB cores 1 and 4 for maximum IF waveform, picture carrier 50% and color carrier 70% (EG), 75% (EK).
   8) Adjust the tuner output transformer so that the waveform is maximum and appears as shown in Fig. 3-5A.

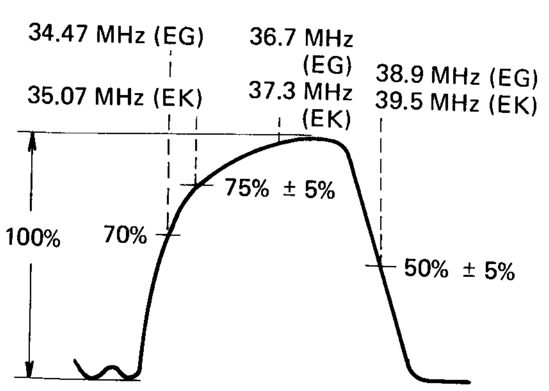


Fig. 3-5A VIF waveform

6. SIF waveform
   1) Set sweep/marker generator for 5.5 MHz (EG), 6.0 MHz (EK) mode and connect probe to TP21.
   2) Set sweep output for 5 dB.
   3) Connect oscilloscope to TP22.
   4) As shown in Fig. 3-6A, so that the center of the S-curve becomes 5.5 MHz (EG), 6.0 MHz (EK), adjust SIF detector transformer T6.

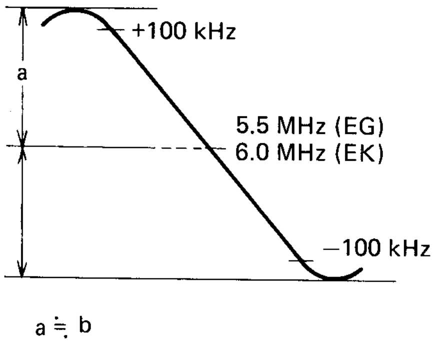


Fig. 3-6A SIF waveform

   5) Adjust input transformer T5 so that the 5.5 MHz ± 100 kHz (EG), 6.0 MHz ± 100 kHz (EK) marker range becomes linear.

7. AFC
   1) Connect a spectrum analyzer to TP21. Set the analyzer to allow measurement of 38.9 MHz ± 50 Hz (EG), 39.500 MHz ± 50 kHz (EK).
   2) Use a TV signal generator and supply channel E-51 (EG), E-61 (EK) signal to VU-77EG or EK.
   3) In the manual tuning mode, perform fine tuning to where the spectrum analyzer indicates in the range of 38.9 MHz ± 50 Hz (EG), 39.500 MHz ± 50 kHz (EK) at TP21.
   4) Release the fine tuning button and wait 1 second. Adjust AFC transformer T2 to obtain 38.9 MHz ± 20 kHz (EG), 39.500 MHz ± 20 kHz (EK) at TP21.

8. Noise
   1) Use a TV signal generator and supply Band III Channel E-51 (EG), E-61 (EK) at field strength of 76 dB.
   2) Perform optimum tuning in the auto tuning mode.
   3) Observe the display on a monitor-TV and adjust R7 for minimum noise.

9. Sound trap
   1) Receive an aerial signal containing a sound carrier, and tune it precisely.
   2) Connect oscilloscope to TP13 video output.
   3) Adjust T4 to minimize leakage of sound carrier component.

10. Video output level
    1) Set for same conditions as above.
    2) Connect oscilloscope to TP-13 video output.
    3) Adjust R27 to obtain 1.0 Vp-p video output.
       a = 1.0 ± 0.1 Vp-p (open)
    4) Adjust R33 (color level) for 0.45 Vp-p color level of the magenta component.
       b = 0.45 ± 0.05 Vp-p

NOTE: Be sure to perform color level adjustment on Band U channel E-51 (EG), E-61 (EK) using a standard color bar RF signal. In some cases, precise adjustment cannot be obtained with other than Channel E-51 (EG), E-61 (EK). Set R22 at the mechanical center position.

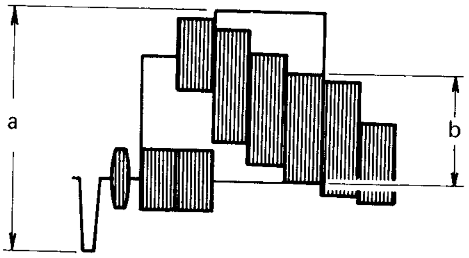


Fig. 3-7A Video output level

11. Audio level
    1) Set for the same conditions as above.
    2) Connect an audio level meter to TP23.
    3) Adjust R44 (audio level) to obtain –14 ± 2 dBs (open).

3-2B. TUNER & IF CIRCUIT (S)

1. BM voltage
   1) Connect a digital voltmeter or a DC voltmeter with the tuner BM terminal of the Tuner & IF circuit board.
   2) Check for 15.5 ± 0.5V.

2. Required Test Equipment
   1) Sweep Generator (With marker)
      VIF: 32.7 MHz
      SIF: 39.2 MHz
   2) Alignment Scope. (or Oscilloscope)
   3) RF TV signal Generator. (Band III color bar)
   4) DC Power supply (For AGC bias) 0 ~ 9.5V DC.
   5) VIF and SIF adjustment probes. (Fig. 3-1B)
   6) Shorting Clip for detector transformer (Fig. 3-2B).

   The above equipment is required for Tuner & IF board adjustment.

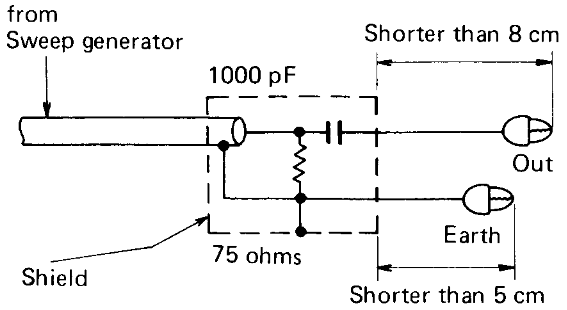

from
Sweep generator
Shorter than 8 cm
1000 pF
Out
Earth
75 ohms
Shield
Shorter than 5 cm

Fig. 3-1B Sweep signal supply cable

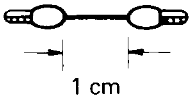


Fig. 3-2B Shorting clip

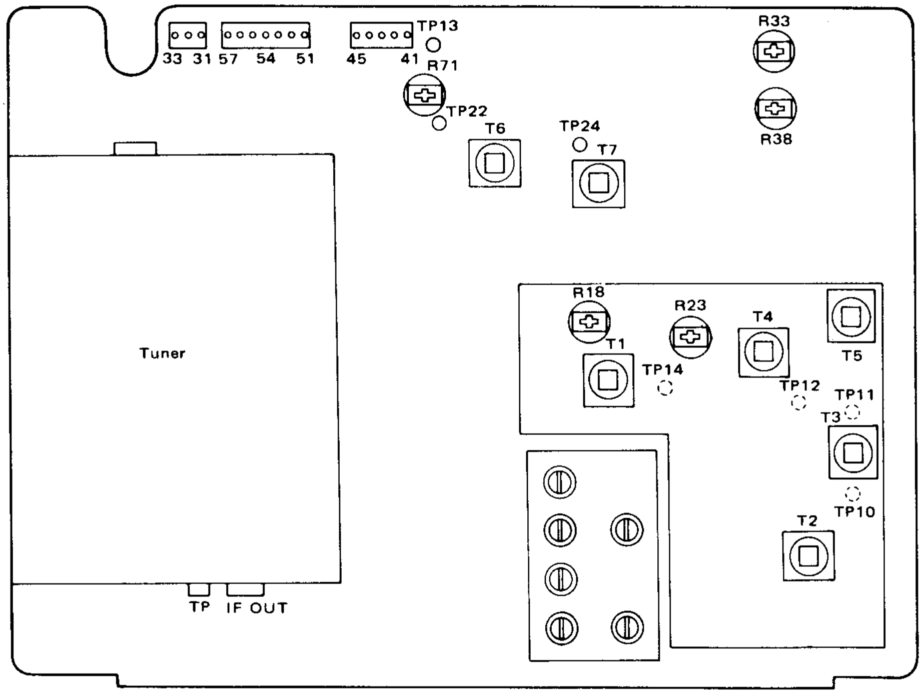

33 31 57 54 51
45 41
TP13
R71
TP22
T6
TP24
T7
R33
R38
Tuner
R18
R23
T4
T1
TP14
T5
TP12
TP11
T3
TP10
T2
TP
IF OUT

Fig. 3-3B Tuner & IF board

3. Detector transformer (T3) and AFC coil (T4) adjustment.
   1) Set sweep/marker generator output for 35 dB.
   2) Connect the HLB-1 output to ground.
   3) Connect the generator output to IC1 pin 1 and connect scope to TP-12.
   4) Connect a DC power supply to TP14.
      When connecting, first connect the ground lead, then the "hot" lead (reverse this when disconnecting).
      Apply AGC voltage; adjust the DC voltage so that level of TP-12 is 0.3Vp-p.
   5) Adjust transformer (T3) and (T4).
      First adjust (T4) for maximum 32.7 MHz marker and then adjust (T3) for maximum 32.7 MHz marker in the observed waveform.
   6) Adjust (T2) AFC coil, so that 32.7 MHz marker becomes hollow position as shown in Fig. 3-4B.

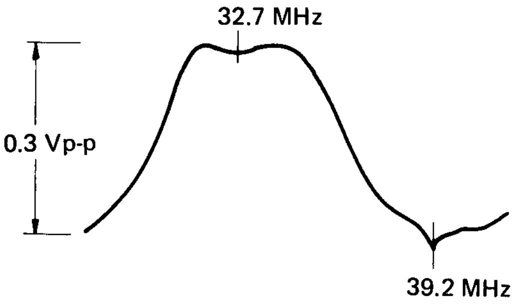


Fig. 3-4B Sound carrier

4. 39.2 MHz Sound carrier trap.
   1) In the same condition as before, short TP-10 and TP-11 with shorting clip on Fig. 3-2B.
   2) Adjust the DC power supply, so that the level of TP-12 is 0.3 Vp-p.
   3) Observe oscilloscope and adjust the transformer (T1) for minimum 39.2 MHz trap and then adjust (T4) for peak at the 37.0 MHz marker of the waveform.

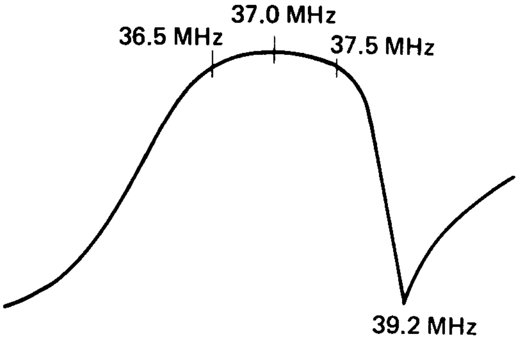


Fig. 3-5B VIF waveform

5. VIF waveform adjustment
   1) Connect generator probe to tuner test point as shown in Fig. 3-6B.
   2) Disconnect ground shorting wire on HLB-1 output.
   3) Another condition as same as before.
   4) Vary the AGC voltage on TP14 and adjust HLB core (5) to minimize the 31.2 MHz marker.
   5) Then adjust the AGC voltage, so that the level of TP12 is 0.8 Vp-p.
   6) Adjust the tuner output transformer so that the waveform is maximum at the 34.85 MHz IF center marker.
   7) Adjust HLB cores 1, 2 and 4 for same waveform as shown in Fig. 3-6B, 32.7 MHz marker 50% ± 10%, 37.0 MHz marker 80% ± 10% and 37.85 MHz marker 40% ± 10%.
      Avoid disturbing HLB cores 3 and 6 (these do not require adjustment).
   8) After adjustment, verify 31.2 MHz and 39.2 MHz trap.

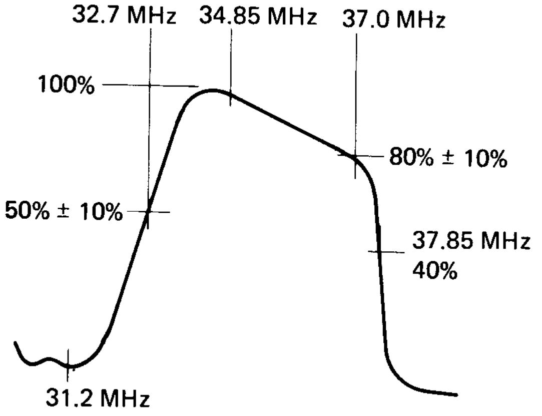


Fig. 3-6B SIF waveform

6. SIF waveform
   1) Set sweep/marker generator output for 55 dB.
   2) Connect oscilloscope to TP24.
   3) Observe oscilloscope and adjust (T6) and (T7) for Peak at the 39.2 MHz marker of the waveform.

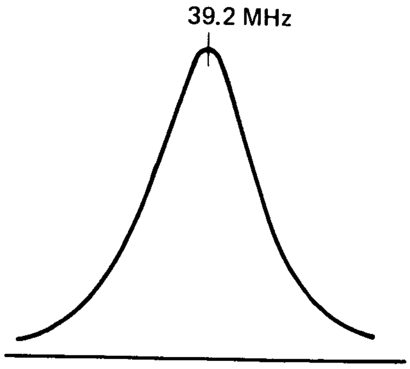


Fig. 3-7B Video output level

7. AFC adjustment
   1) Connect a spectrum analyzer to TP24. Set the analyzer to allow measurement of 39.19 MHz ± 50 kHz.
   2) Use a TV signal generator and supply channel F-6 (Band III channel 6) signal with sound carrier to VU-77S.
   3) In the manual tuning mode with AFC OFF, perform fine tuning where the spectrum analyzer indicates in the range of 39.19 MHz ± 50 kHz at TP24.
   4) Adjust AFC transformer (T2) with AFC ON to obtain 39.19 MHz ± 20 kHz at TP24.

8. Noise VR adjustment
   1) Use a TV signal generator and supply Band III channel 6 at field strength of 76 dB.
   2) Perform optimum tuning in the auto tuning mode.
   3) Connect oscilloscope to TP16 AGC out.
   4) Adjust R18 minimum noise on TV picture and then verify the DC potential on TP16 is 1 volt before the maximum DC voltage.

9. Video level adjustment
   1) Set for same condition as before.
   2) Connect oscilloscope to TP13 Video output.
   3) Adjust R23 to obtain 1 Vp-p video signal.
   4) Adjust R33 for 0.18 ~ 0.2 Vp-p color level of the magenta component.

10. Audio level adjustment
   1) Set for same conditions as before.
   2. Connect an audio level meter to TP-22.
   3) Adjust R71 to obtain −17 dBs ± 2 dBs.

3-3. CHECKS AND ADJUSTMENTS FOR BACK-UP

In the CLOCK START mode with the MAIN switch and the FUNCTION switch pressed to ON, check the following points.

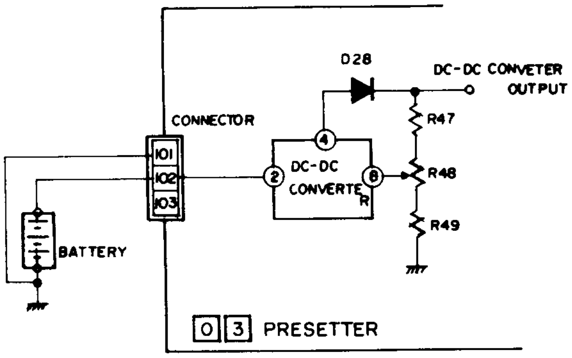


Fig. 3-8

1. Charging Function

   When the connector from the battery on the presetter circuit board is removed and 15mA (220Ω) load is connected to the connector 102 make sure that the output voltage is more than 3V.

2. DC-DC Converter Output
   1) Remove the connector from the battery on the presetter circuit board and connect external DC voltage (2.4V DC) to the connector 102 .
   2) When the MAIN switch on the rear panel is pressed to OFF, check that DC-DC converter output (cathode of D28) is 10.5 ± 0.2V.
   3) If it is not within the above range, adjust R48 (10.5V ADJ) on the presetter circuit board.

3. Back-up Preset
   1) Remove the connector from the battery on the presetter circuit board and connect external DC voltage 2.4V.
   2) When the switch is pressed to ON more than ten minutes·after the MAIN switch was turned off, make sure that there does not appear the power failure indication but counting of time continues.
   3) Then put the connector from the battery back to where it was and make the same check as above.

3-4. CHECKS AND ADJUSTMENTS FOR PROGRAMMABLE TIMER AND DISPLAY

1. Precautions during Servicing

   This is a programmable time utilizing a microcomputer. The operation procedure is exactly programmed in so that the contents are put in and stored in the memory by operating each button according to this procedure.

   When this programmable timer is impressed with strong pulse noise or static electricity from the outside, there may occur such symptoms as follows:
   1) The memory will be erased.
   2) Abnormality will occur on the display indication or no indication appear.
   3) Even if the operation button is switched on, no change will occur.

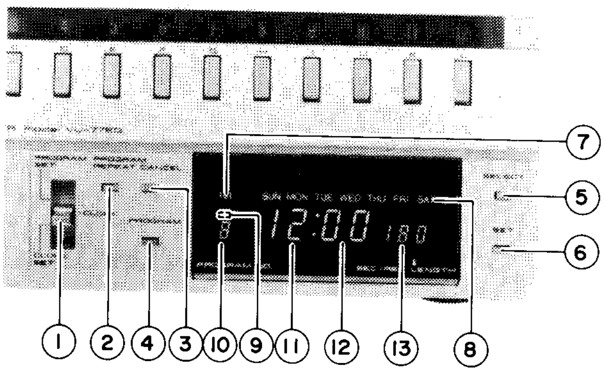
   In such a case as these symptoms occur, check the following points:

   When the power source plugged in again one or two minutes after unplugged from the socket, check that the Power failure indication appears first and then make sure that normally operation and display is normal indication.

   Only when anything abnormal is seen even after the above check, it is to be judged that there is a trouble with the timer circuit or the display circuit. Then check these circuits and if required replace the IC or transistor, etc.

2. IH OSC
   1) Connect the frequency counter to TP-1 on the TIMER circuit board.
   2) Check that the oscillation frequency is 4,194,304 Hz ± 10 Hz.
   3) If it is not within the above range, adjust C104 on the TIMER circuit board.

3. Overall Operation Checks



1. Display function select switch
   - PROGRAM SET
   - CLOCK
   - CLOCK SET
2. REPEAT button
3. CANCEL button
4. PROGRAM number button
5. SELECT button
6. SET button
7. Week indicator
8. Day indicator
9. Repeat indicator
10. PROGRAM NO. indicator
11. Hour digits
12. Minute digits
13. SEC/REC LENGTH (MIN) digits

Items	Operation Procedure	Operation Check Points
1) Power-off indication	*Plug in the power source (Power switch on the front panel is set to ON)	*0 hour 00 m 00 second and Sunday blinks. The channel is set to A.
2) Clock Set (Clock Setting)	*Set the timer switch to the CLOCK SET	*Counting of second starts. Second indication blinks.
3) Second Setting	*Press Set Switch	*Blinking stops with second reset. While keeping the switch pressed, counting discontinues.
4) Minute Setting	*Press Select Button *Press Set Switch	*Minute indication blinks. *Blinking stops. *Each time the switch is pressed, the minute indication advances in single increment. *Keeping the switch more than one second permits fast forwarding at about 6.7 Hz. *There is no shift to hour. (00 → 59 → 00)
5) Hour Setting	*Select Button *Set Switch	*Hour indication blinks. *Blinking stops. *Each time the switch is pressed, the hour indication advances in single increment. *Keeping the switch pressed more than one second permits fast forwarding at about 6.7 Hz. *There is no shift to the day of week. (0 → 23 → 0)
6) Week Setting	*Select Button *Set Switch	*The day of week blinks. *Blinking stops. *Each time the switch is pressed, the day of week shifts. *Keeping the switch pressed more than one second permits fast forwarding at about 3.4 Hz. (SUN → SAT → SUN)
7) Second Setting	*Select Button	*Return to Second Setting 3).
8) Program Setting	*Set the timer switch to the Program Set	*Changes to program indication. *Program No. 1 Channel No. A (Blinker + Flicker) Day of Week 1st SUN Time 0 hour 00 minute Recording Time 000 minute
9) Recording Channel	*Set Switch	*Blinking stops with only the Flicker in operation. *Each time the switch is pressed, Channel No. shifts. *Keeping the switch pressed more than one second permits fast forwarding at about 3.4 Hz. (A → H → A)
10) Recording Start Day	*Select Button *Set Switch	*1st SUN blinks. *Blinking stops. *Each time the switch is pressed the day of week shifts. *Keeping the switch pressed more than one second permits fast forwarding at about 3.4 Hz. (1st SUN → 1st SAT → 2nd SUN → 2nd SAT → 1st SUN SAT (DAILY indication) - 1st SUN)
11) Recording Start Time (Hour Digits)	*Select Button *Set Switch	*Same as 5) *Same as 5)
12) Recording Start Time (Minute Digits)	*Select Button *Select Switch	*Same as 4) *Same as 4)

<table>
<tr><th>Items</th><th>Operation Procedure</th><th>Operation Check Points</th></tr>
<tr><td>13) Recording Time</td><td>*Select Button
*Select Switch</td><td>*Three digits of the recording time blink.
*Blinking stops.
*Each time the switch is pressed digits advance in 5 (minute) steps.
*Keeping the switch pressed more than one second permits fast forwarding. (000 → 395 → 000)</td></tr>
<tr><td>14) Recording Channel</td><td>*Select Button</td><td>*Return to Recording Channel Setting 9).</td></tr>
<tr><td>15) Repeat</td><td>*Weekly Picture Recording Reservation Button</td><td>*Weekly "—" indication flashes.
*The program is repetitionary.</td></tr>
<tr><td>16) Program No.</td><td>*Program No. Button</td><td>*Each time the switch is pressed Program No. changes. (1 → 8 → 1).</td></tr>
<tr><td>17) Cancel</td><td>*Program Cancel Button</td><td>*Indicated contents of the program are cancelled. Return to 8).</td></tr>
<tr><td>18) All Cancel</td><td>*Press Program Call Button and Cancel Button simultaneously.</td><td>*All the contents of programs 1 to 8 are cancelled. Return to 8).</td></tr>
<tr><td>19) Program Invalidity</td><td></td><td>*When the recording time is 000 minute, the programs becomes invalid.</td></tr>
<tr><td>20) Program Priority</td><td></td><td>*Of the programs made at the same time, the program whose No. is smaller is executed.
*When programs overlap, the program entered later is enabled.</td></tr>
<tr><td>21) Timer Operation</td><td>*Power Switch "Timer"
*10 second to scheduled time</td><td>*Power Lamp lights out.
*CH is locked.
*Power Lamp lights.
*The specified channel is set.
*Start loading and recording in RECORD mode.</td></tr>
<tr><td>22) Program during Recording</td><td>*Set the timer switch to the program set
*In case of the program being executed
*Other program</td><td>*Changes to program indication.
*Only the recording time can be modified.
1. Recording Time Elapsed Time Continue recording.
2. Recording Time Elapsed Time Cancel recording within one minute.
*Same as the ordinary PROGRAM SET mode.</td></tr>
<tr><td>23) Termination of Recording</td><td>*The time within the recording length added to recording start time</td><td>*Prestart output is turned off. Return to 21)
*In case of not in REPEAT mode, the contents of program are to be cancelled.</td></tr>
<tr><td>24) Continued Program</td><td></td><td>*When carrying out the continued or overlapped program, prestart operation is not necessary.</td></tr>
<tr><td>25) Digit Advancing</td><td></td><td>*In CLOCK mode each digit should be advanced.
(eg.) SAT 23 hours 59 minutes 59 seconds - SUN 0 hour 00 minute second.</td></tr>
<tr><td>26) Band Output</td><td>*Band Select Switch</td><td>*Make sure that there will exist the following out levels in accordance with the selected bands.
<table>
<tr><th>BAND</th><th>BU OUT (P4–42)</th><th>BS OUT (P4–43)</th><th>BV OUT (P4–44)</th></tr>
<tr><td>VL</td><td>0V</td><td>30V</td><td>15V</td></tr>
<tr><td>VH</td><td>0V</td><td>0V</td><td>15V</td></tr>
<tr><td>U</td><td>15V</td><td>0V</td><td>0V</td></tr>
</table></td></tr>
<tr><td>27) AFC Output</td><td>*AFT Switch</td><td>*Observe that AFT ON/OFF operate normally.</td></tr>
</table>

Items	Operation Procedure	Operation Check Points
28) Channel Selection	*Channel Button (A ~ H Channel)	*The channel corresponding to the switch pressed is selected and indicated.
29) CH. LOCK	*CH. LOCK is switched ON	*The channel will not change even if the Channel Button is pressed.
30) Voice Mute	*At the time of channel alteration	*Voice Mute should be operational.

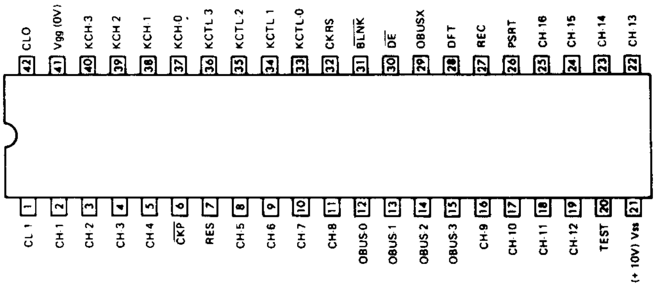
4. μPD5530C-100 (Programmable Timer)

1) Outline

μPD553C-100 is Programmable Timer PMOS LS1 which has the built-in channel selecting function by means of a preset volume system electronic tuner.

This system consists of μPD552C-068 (indicator tube driver) and SM5502A (1 Hz pulse generator).

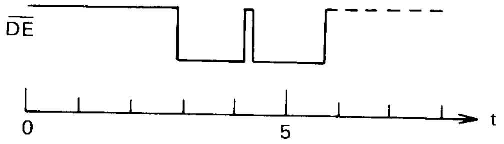
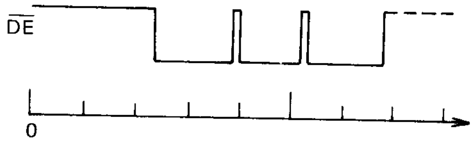
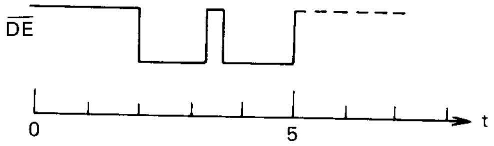
2) Top View of μPD553C-100


CLO 42
Vgg (0V) 41
KCH-3 40
KCH-2 39
KCH-1 38
KCH-0 37
KCTL-3 36
KCTL-2 35
KCTL-1 34
KCTL-0 33
CKRS 32
$\overline{\text{BLNK}}$ 31
$\overline{\text{DE}}$ 30
OBUSX 29
DFT 28
REC 27
PSRT 26
CH-16 25
CH-15 24
CH-14 23
CH-13 22
1 CL 1
2 CH-1
3 CH-2
4 CH-3
5 CH-4
6 $\overline{\text{CKP}}$
7 RES
8 CH-5
9 CH-6
10 CH-7
11 CH-8
12 OBUS-0
13 OBUS-1
14 OBUS-2
15 OBUS-3
16 CH-9
17 CH-10
18 CH-11
19 CH-12
20 TEST
21 (+10V) Vss

3) Description of Main Input Terminals (The bar above the symbol signifies LOW ENABLE)

Symbol (Pin No.)	Name	Contents
KCTL-0 ~ 3 (33 ~ 36)	Key of Control	Input of mainly the switch data related to the timer by means of key scan input data.
KCH-0 ~ 3 (37 ~ 40)	Key of Channel	Input of mainly the direct band selecting switch data by means of key scan input data.
CKP (6)	Clock Pulse	Input of 1 Hz Clock pulse

4) Description of Output Terminals (The bar above the symbol signifies NEGATIVE POLARITY OUTPUT)

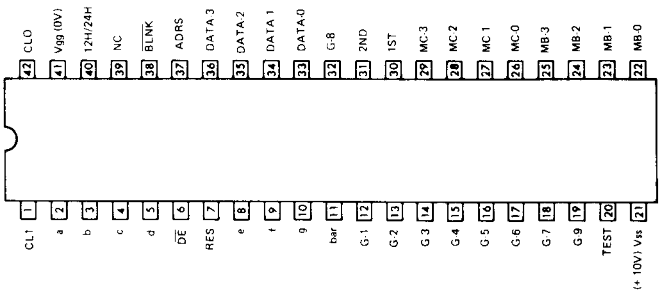
Symbol (Pin No.)	Name	Contents
CH-1 ~ 16 (2 ~ 5) (8 ~ 11) (16 ~ 19) (22 ~ 25)	Channel Out	Discrete output of receiver channel.
OBUS-0 ~ 3 (12 ~ 15) OBUSX (29)	Output Bus	Time divisional output of key scan sense output and display data.
PSRT (26)	Prestart	HIGH Level is reached 10 seconds prior to the start time of the picture recording of program and LOW level is reached at the termination time.
REC (27)	REC Start	HIGH Level is reached at the start time of the picture recording of program and LOW level is reached at the termination time.
DFT (28)	AFC Defeat	HIGH Pulse of 250 m sec. is output immediately before CHANNEL OUT output changes.
DE (30)	Display Data Enable	Provide with μ552C-068 the timing to put in display data. The timing chart is as shown below: (1) CLOCK mode (without first channel up-down.)  (2) CLOCK mode (with first channel up-down.)  (3) PROG SET/CLOCK SET mode 
BLNK (31)	Blank Enable	The flashing timing of specific digits is output to μPD552C-068. Lighting lasts as long as BLNK is at HIGH level.
CKRS	Clock Reset	In CLOCK SET mode HIGH pulse of 450 m sec. is output to SM5502A immediately after 0 second modification.

5. IC for Display

1) Outline

μPD 552C-068 is PMOS-LSL that drives the indication tube and LED for the channel position indication according to the indication data sent out from μPD553C-100 (Programmable Timer).

2) Top View of μPD552C-068


CLO
Vgg (0V)
12H/24H
NC
BLNK
ADRS
DATA-3
DATA-2
DATA 1
DATA-0
G-8
2ND
1ST
MC-3
MC-2
MC 1
MC-0
MB-3
MB-2
MB-1
MB-0
42
41
40
39
38
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36
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9
10
11
12
13
14
15
16
17
18
19
20
21
CL1
a
b
c
d
DE
RES
e
f
g
bar
G-1
G-2
G 3
G-4
G-5
G-6
G-7
G-9
TEST
(+ 10V) Vss

3) Description of Main Input Terminals (The bar above the symbol signifies LOW ENABLE)

Symbol (Pin No.)	Name	Contents
DATA-0 ~ 3 (33 ~ 36)	Display Data	Indication data input. With a part of RAM of μPD552C-068 as the indication data latch area, assignment of the address and renewal of memory data are carried out by this 4 bit data.
ADRS (37)	Address	Indication data indentification input. HIGH level is reached when DATA-0 ~ 3 means the address of RAM and LOW level is reached when it means the memory data.
BLNK (38)	Blank Timing	Flashing timing input. When there is flashing in the indication tube, the fixed items are to be blank during the period of LOW level.
12H/24H	Display Format Select	HIGH level is input in case of 12-hour indication and LOW level is input in case of 24-hour indication.
DE (6)	Display Data Enable	Input the timing to put in the indication data input.

4) Description of Output Terminals

Symbol (Pin No.)	Name	Contents
a ~ d (2 ~ 5) e ~ g (8 ~ 10) bar (11)	Segment Out	Indication tube anode drive output (segment).
G1 ~ G7 (12 ~ 18) G-9, G-8 (19), (32)	Digit Out	Indicatin tube frid drive output.
MB 0 ~ 3 (22 ~ 25) MC 0 ~ 3 (26 ~ 29)	Channel Display Matrix Out	LED for channel position drive output.
1ST (30) 2nd (31)	First Week Out Second Week Out	Indication tube anode drive output (1st/2nd).

SECTION 4

EXPLODED VIEWS AND PARTS LIST

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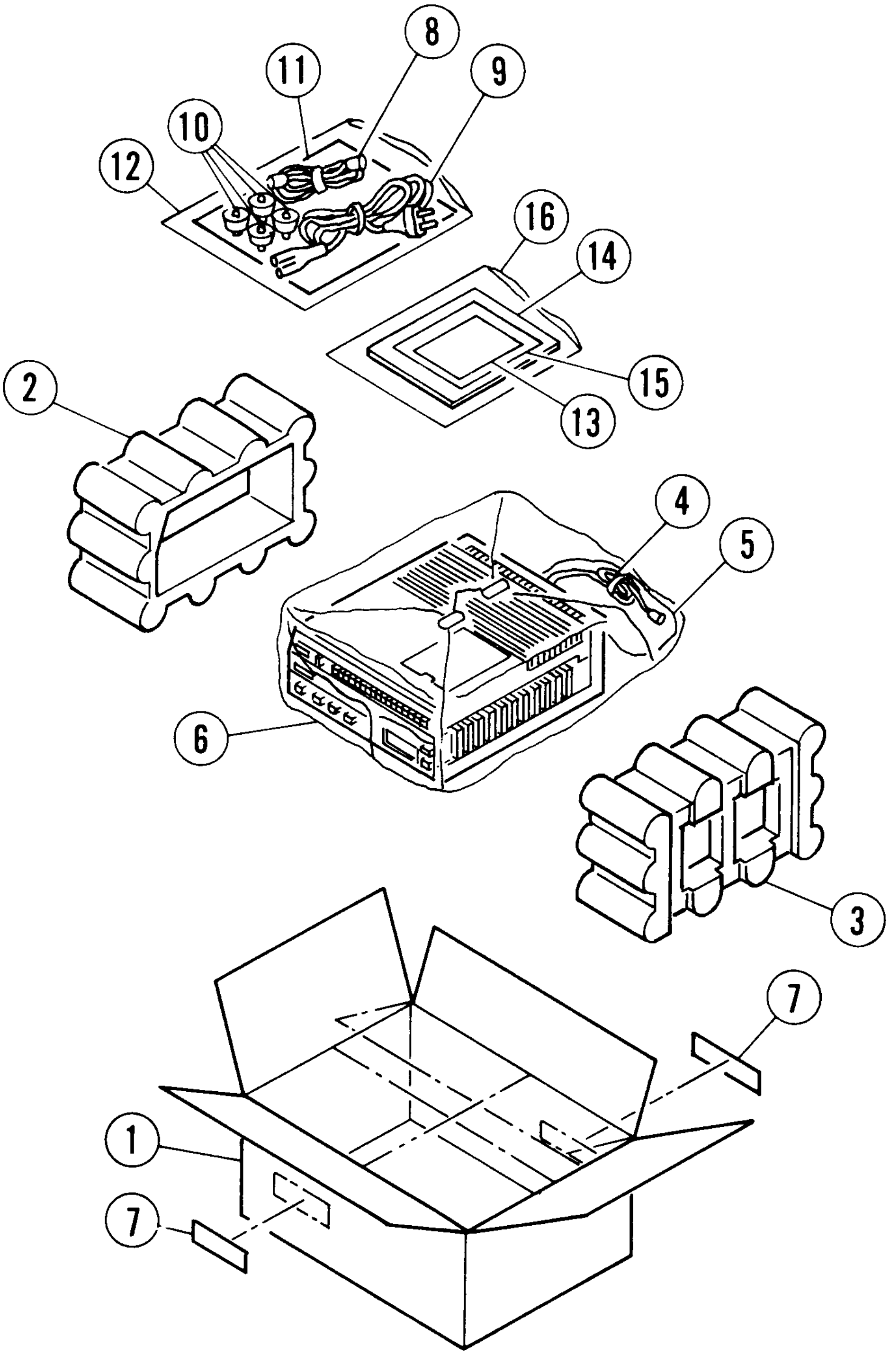
4-1. PACKING BLOCK 4-2
4-2. CABINET BLOCK 4-3
4-3. FRONT COVER BLOCK 4-4
4-4. CHASSIS BLOCK 4-5
4-5. CONNECTOR BLOCK 4-6
4-6. HEAT SINK BLOCK 4-7

PACKING BLOCK


8
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16
14
2
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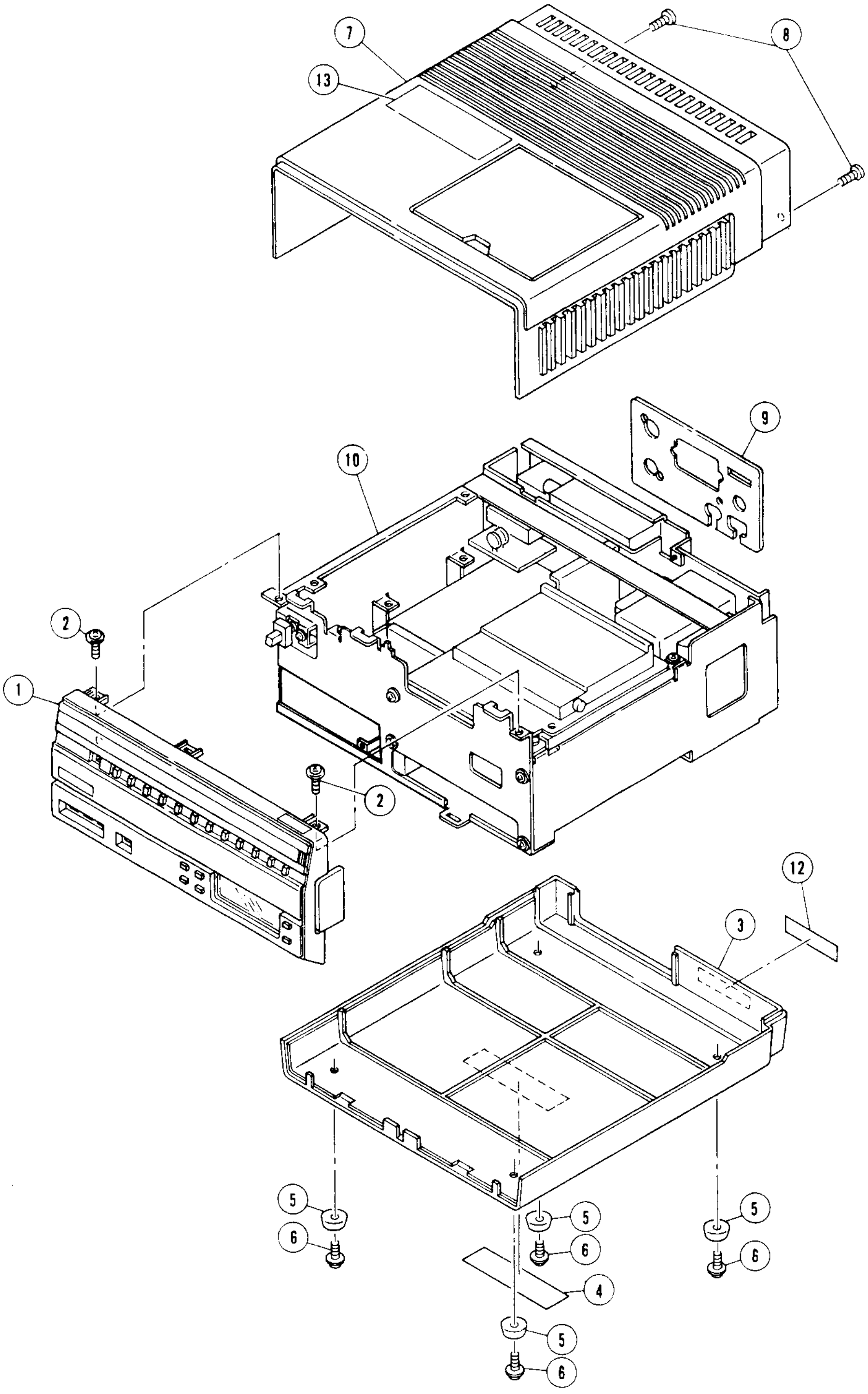
13
4
5
6
3
7
1
7

4-1. PACKING BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
1-8	EW707086	AERIAL CABLE ASSY (EG, EK)
1-8	EW705435	AERIAL CABLE ASSY (S)
1-9	EW706041	AC CORD (EG, S)
1-9	EW709819	AC CORD (EK)

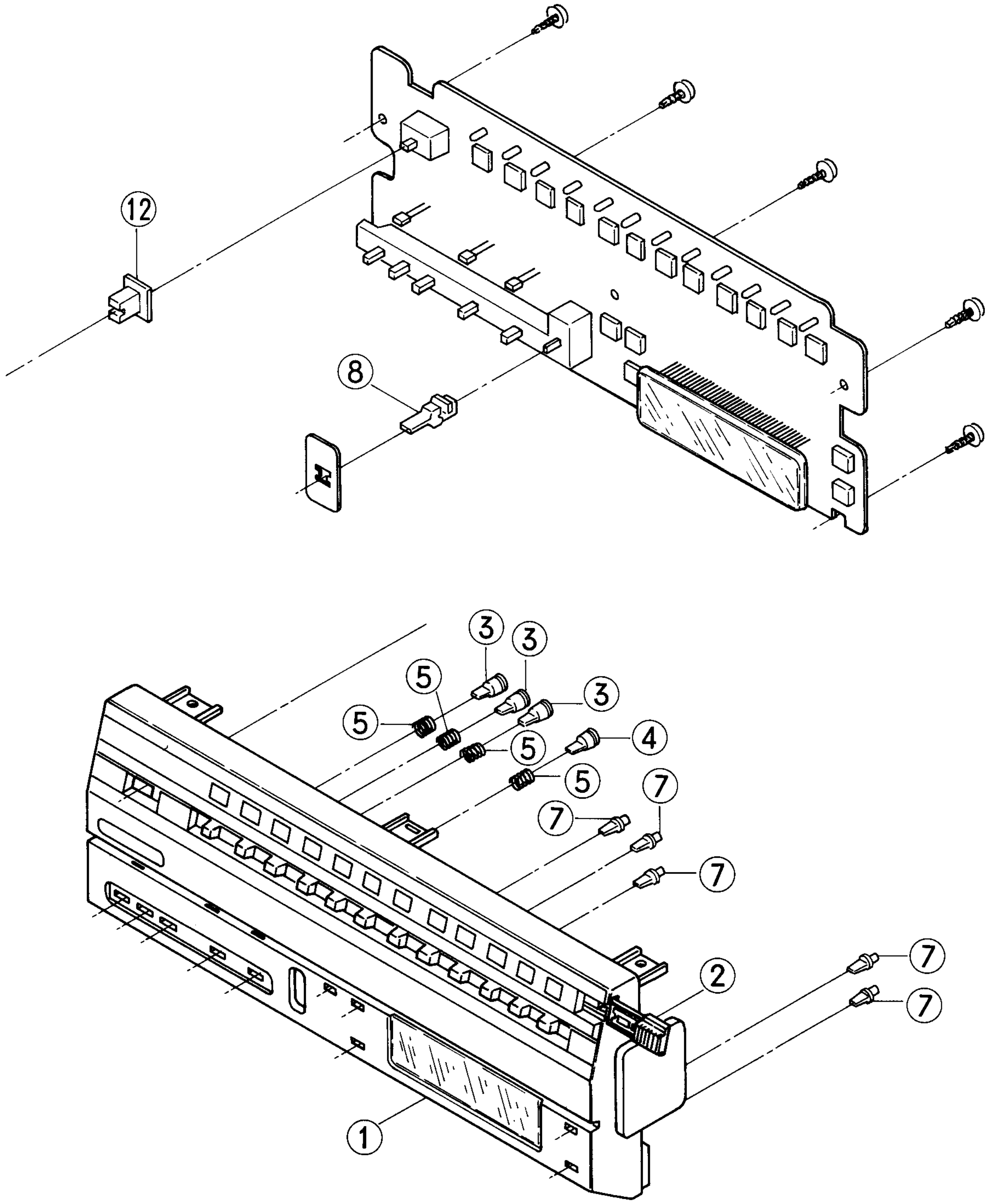
CABINET BLOCK



4-2. CABINET BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
2-3	SP707063	COVER BOTTOM
2-5	SA707064	FOOT
2-6	ZS608400	PAN30x08STL NI3
2-7	BD707065	COVER UPPER BLK
2-8	ZS608400	PAN30x08STL NI3
2-9	SP707066	PANEL REAR (EG)
2-9	SP707136	PANEL REAR (EK)
2-9	SP707139	PANEL REAR (S)

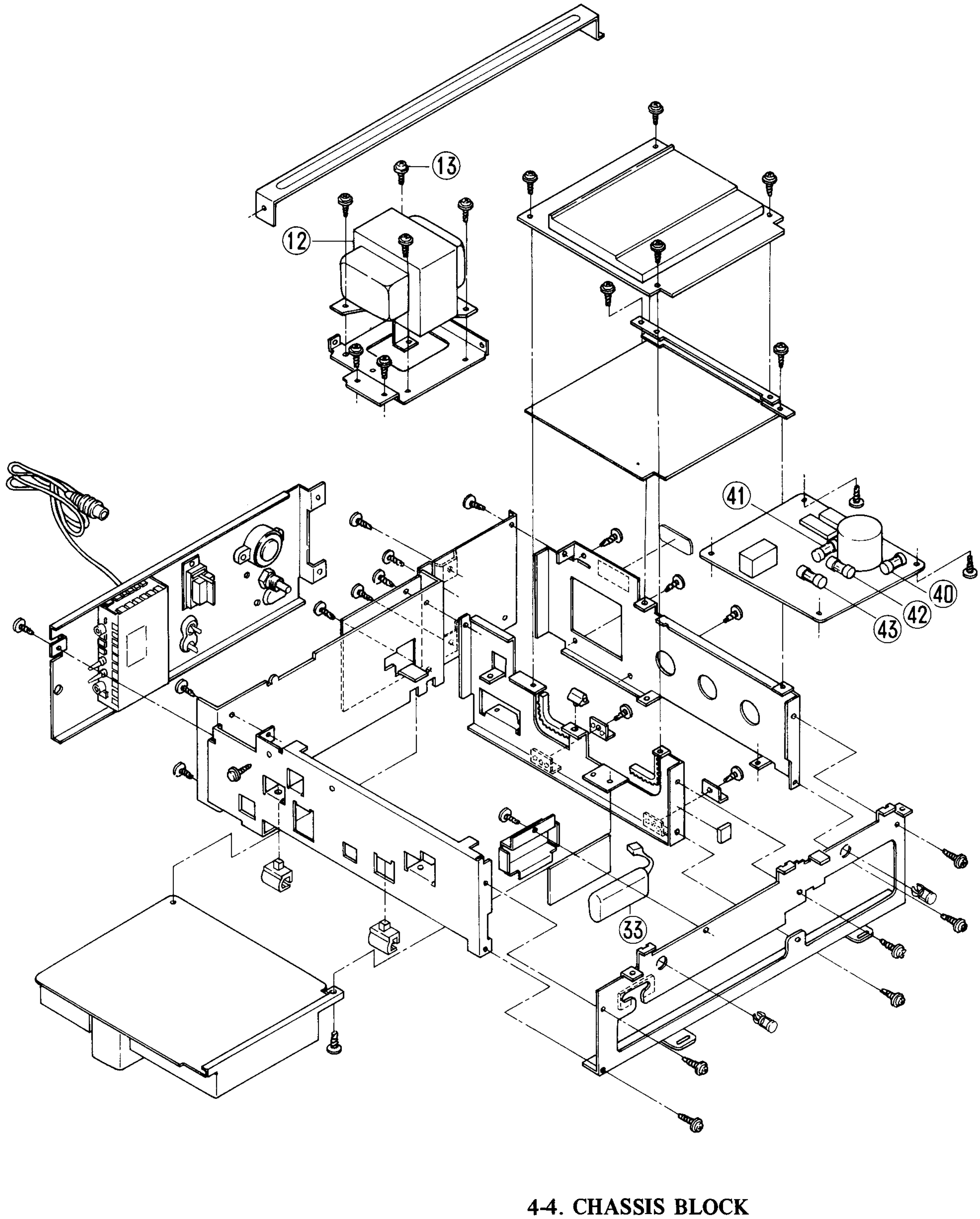
FRONT COVER BLOCK



4-3. FRONT COVER BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
3-1	BD707067	PANEL FRONT BLK VU-77EG(INCL. 2)
3-1	BD707137	PANEL FRONT BLK VU-77EK(INCL. 2)
3-1	BD707140	PANEL FRONT BLK VU-77S (INCL. 2)
3-2	VT707068	HOLDER CHANNEL FILM BLK
3-3	SK707069	KNOB PUSH
3-4	SK707070	KNOB PUSH
3-5	ZG707071	SP COIL
3-7	SK707072	KNOB TIMER
3-8	SK707074	KNOB SW
3-12	SK707075	KNOB PUSH

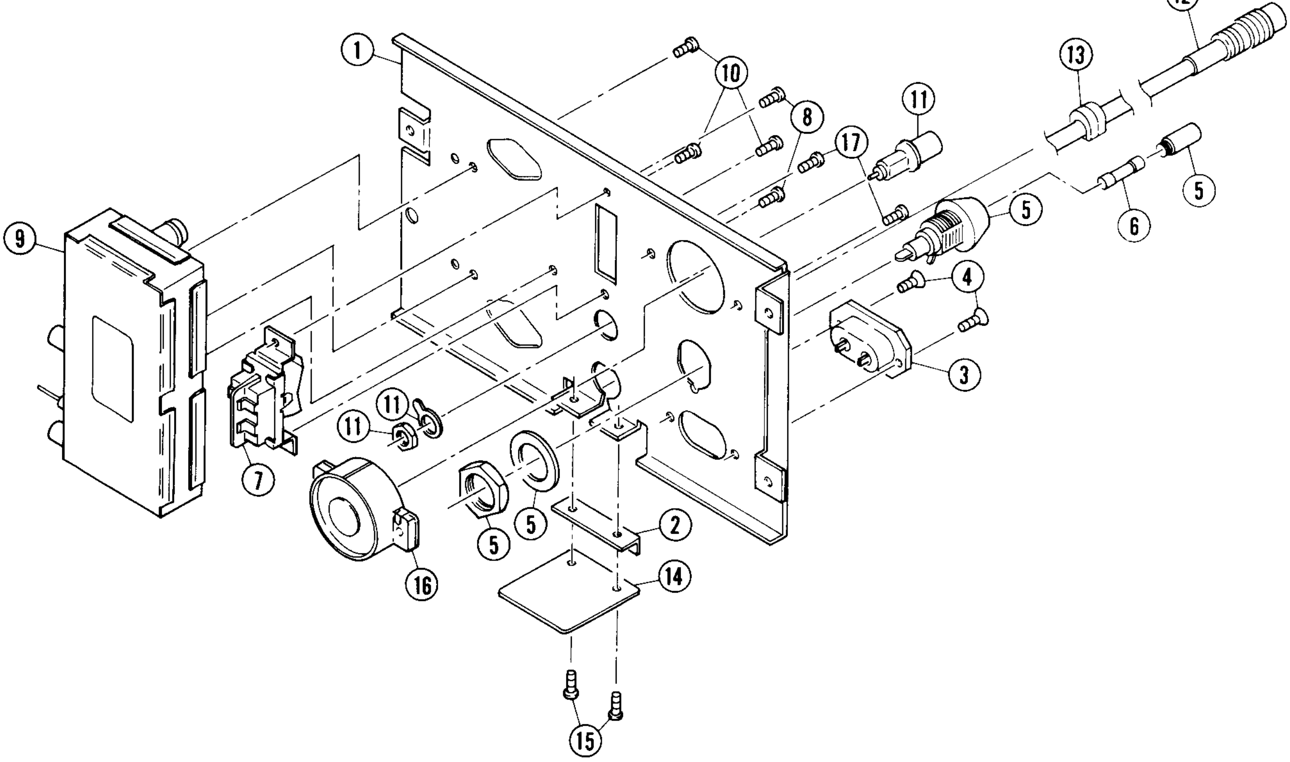
CHASSIS BLOCK



4-4. CHASSIS BLOCK

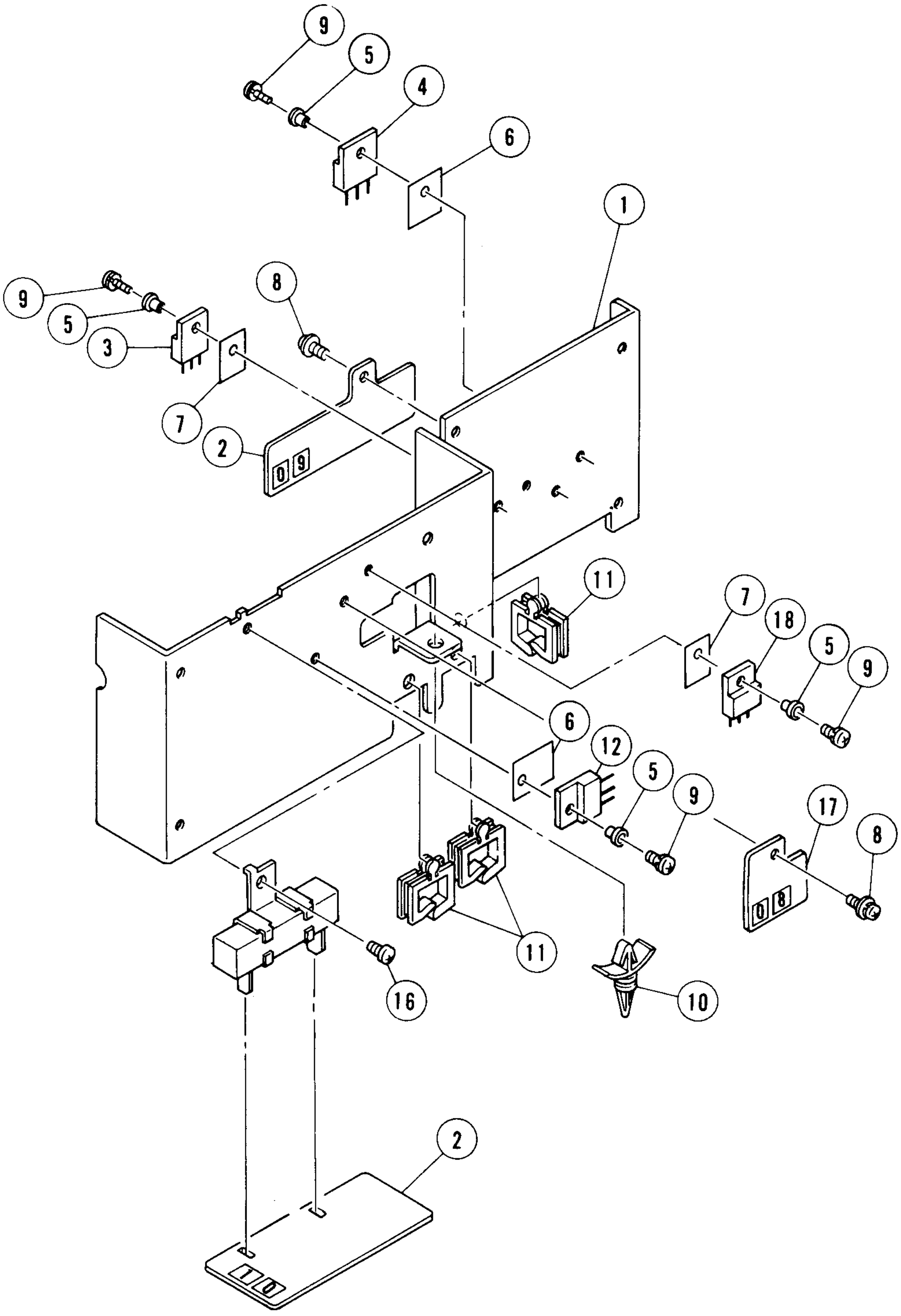
REF. NO.	PARTS NO.	DESCRIPTION
4-12	BT707076	⚠ TRANS POWER
4-13	ZS413201	PAN40x08STL CMT
4-33	VT707077	BATTERY BLK
4-40	EF707078	⚠ FUSE T 250V 5A (F2)
4-41	EF707079	⚠ FUSE T 250V 4A (F3)
4-42	EF741197	⚠ FUSE T 250V 0.5A (F5)
4-43	EF700851	⚠ FUSE T 250V 1A (F6)

CONNECTOR BLOCK



4-5. CONNECTOR BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
5-3	EJ740971	⚠ AC INLET
5-4	ZS200384	CTS30x06STL CMT
5-5	EJ741465	⚠ FUSE HOLDER
5-6	EF700851	⚠ FUSE T 250V 1A (F1)
5-7	ES707080	⚠ SW SEASAW (MAIN POWER SW)
5-9	VT702476	BOOSTER VS-10EG
5-9	VT702478	BOOSTER VS-10EK
5-9	VT705437	BOOSTER VS-10S
5-11	BJ707081	AERIAL CONNECTOR BLK (EG, EK)
5-11	BJ707150	AERIAL CONNECTOR BLK (S)
5-12	EW707082	DC CORD BLK
5-13	EZ702852	CORD STOPPER
5-16	EJ709807	⚠ VOLTAGE SELECTOR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17
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08
11
16
10
2
10

4-6. HEAT SINK BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
6-3	ET707083	TR 2SC2577Y (X102)
6-4	EI328796	IC μPC78M12H (IC1)
6-12	ET707083	TR 2SC2577Y (X101)
6-18	EI707085	IC μPC7815 (IC2)

SECTION 5

CHARTS AND DIAGRAMS

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5-6. REGULATOR AND POWER SUB CIRCUIT BOARDS (EG/EK/S) 5- 8
5-7. PRESETTER AND TIMER SCHEMATIC DIAGRAMS-1 (EG/S) 5- 9
5-8. PRESETTER AND TIMER CIRCUIT BOARDS-1 (EG/S) 5-10
5-9. PRESETTER AND TIMER SCHEMATIC DIAGRAMS-2 (EK) 5-11
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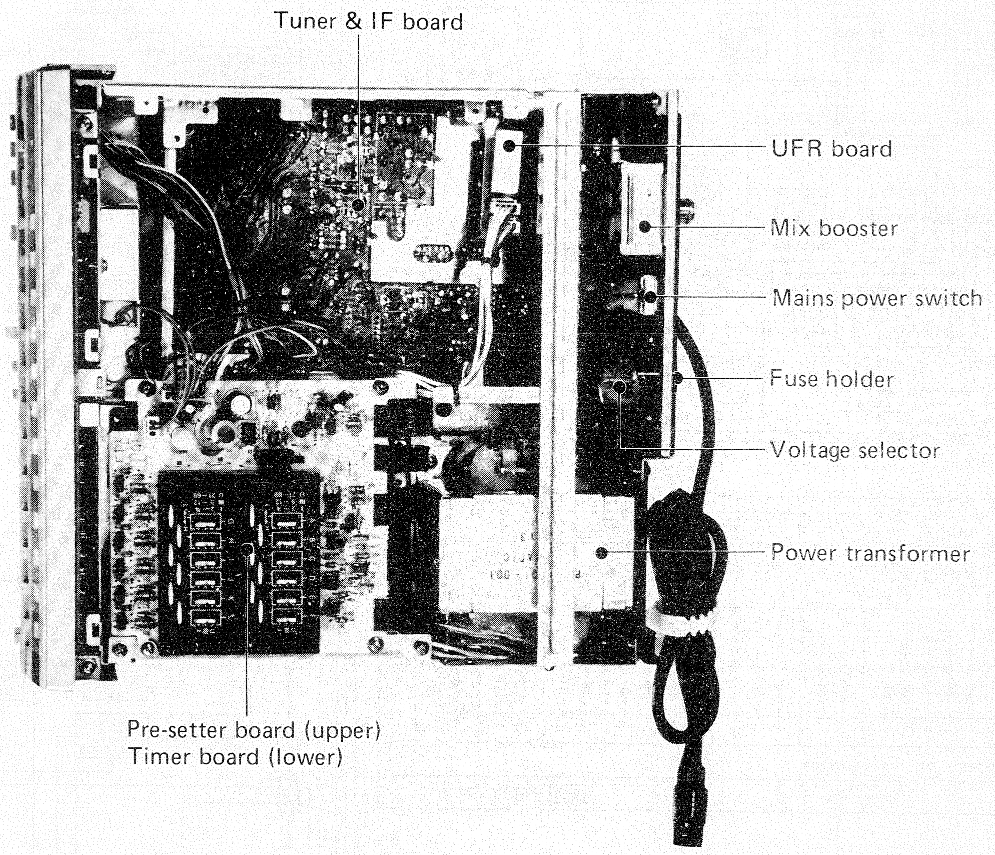
5-12. FUNCTION AND DISPLAY CIRCUIT BOARD (EG/EK) 5-14
5-13. FUNCTION AND DISPLAY SCHEMATIC DIAGRAM (S) 5-15
5-14. FUNCTION AND DISPLAY CIRCUIT BOARD (S) 5-16
5-15. TUNER & IF SCHEMATIC DIAGRAM-1 (EG) 5-17
5-16. TUNER & IF CIRCUIT BOARD-1 (EG) 5-18
5-17. TUNER & IF SCHEMATIC DIAGRAM-2 (EK) 5-19
5-18. TUNER & IF CIRCUIT BOARD-2 (EK) 5-20
5-19. TUNER & IF SCHEMATIC DIAGRAM-2 (S) 5-21
5-20. TUNER & IF CIRCUIT BOARD-2 (S) 5-22

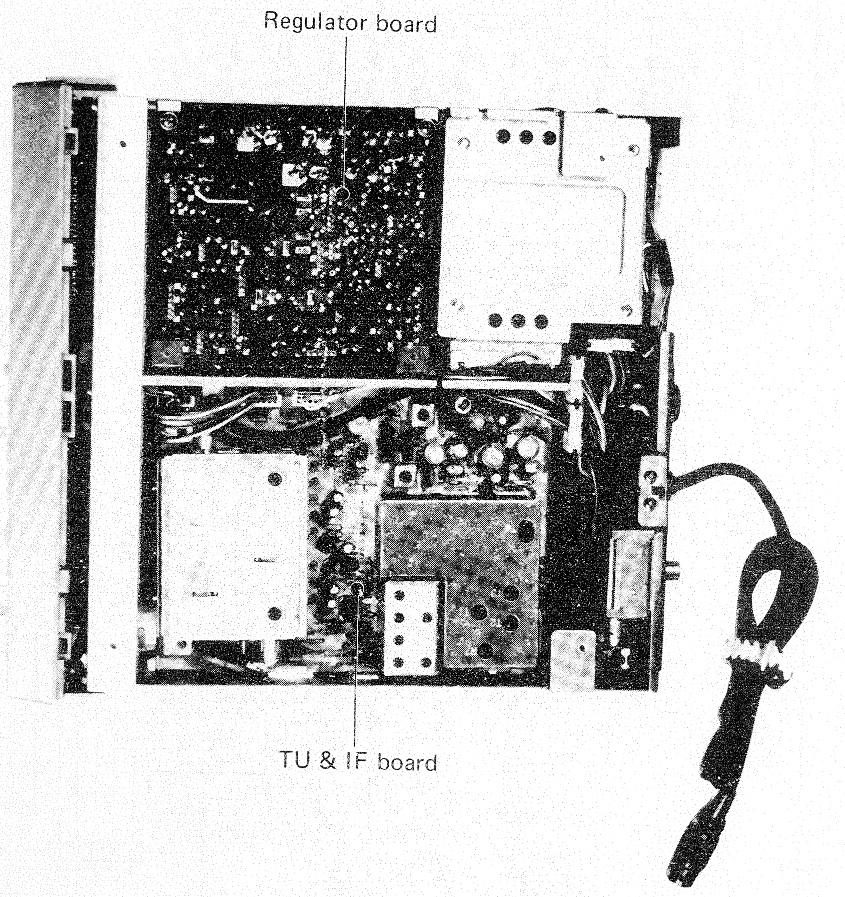
5-1. ELECTRICAL PARTS LOCATION

A B C D E F G H I J K L M N

1 2 3 4 5 6 7 8 9

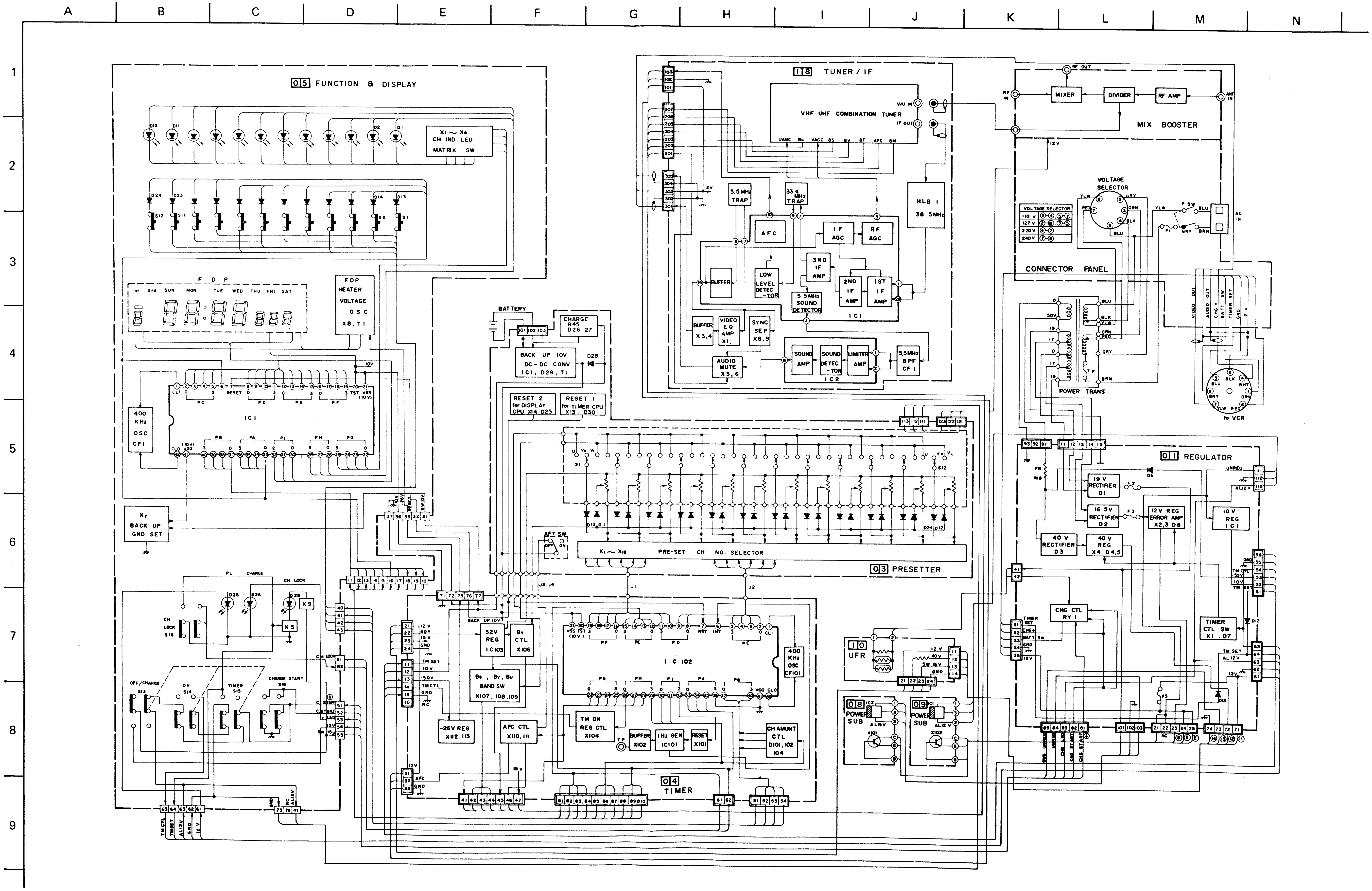

Tuner & IF board
UFR board
Mix booster
Mains power switch
Fuse holder
Voltage selector
Power transformer
Pre-setter board (upper)
Timer board (lower)

(a) Top view


Regulator board
TU & IF board

(b) Bottom view

5-2. OVERALL WIRING-1 (EG)



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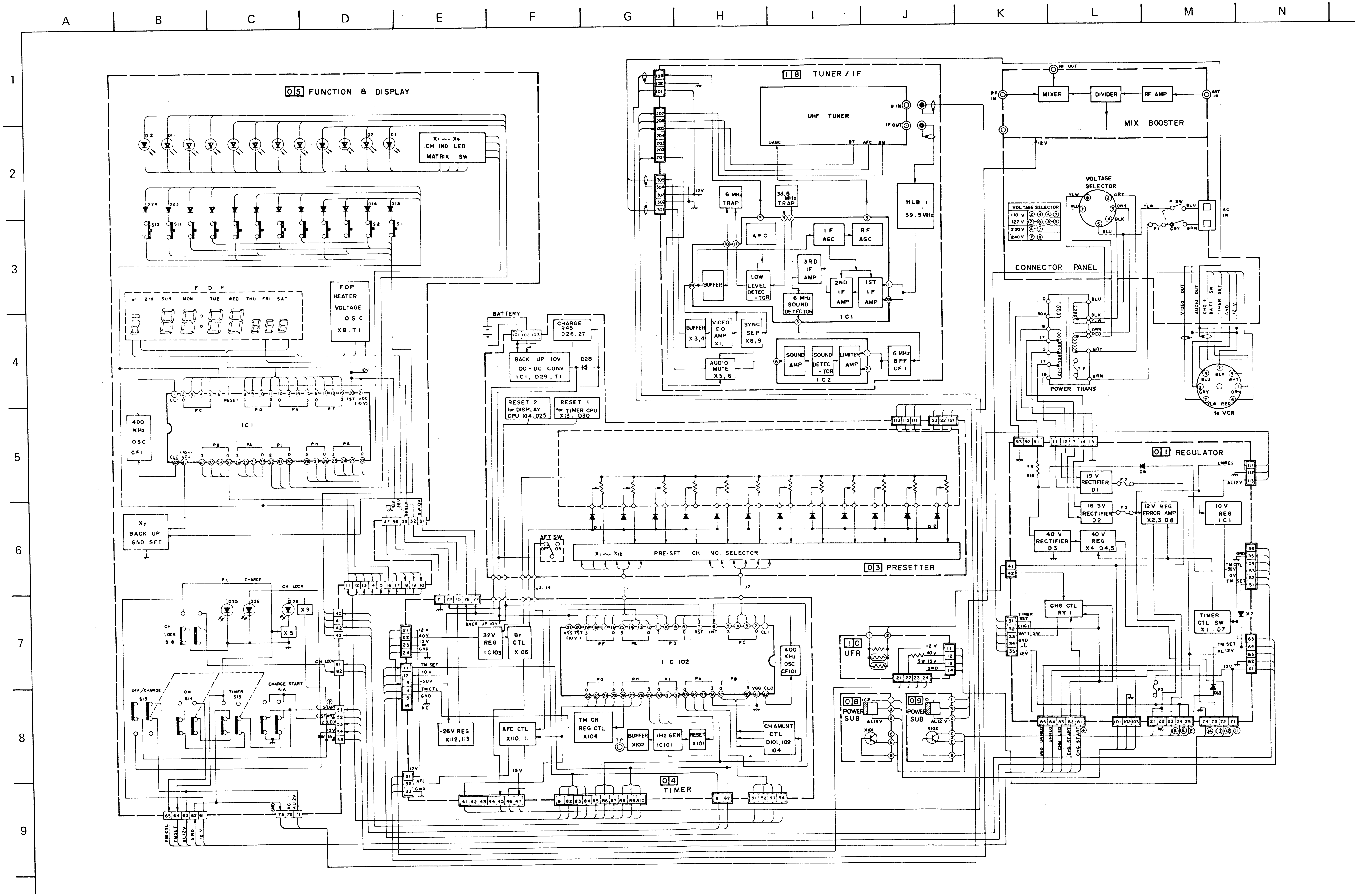
05 FUNCTION & DISPLAY
X1 ~ X6 CH IND LED MATRIX SW
FDP
1st 2nd SUN MON TUE WED THU FRI SAT
FDP HEATER VOLTAGE OSC X8, T1
400 KHz OSC CF1
IC1
X7 BACK UP GND SET
CH LOCK S18
OFF/CHARGE S13
ON S14
TIMER S15
CHARGE START S16
PL
CHARGE
CH LOCK
X9
X5
BATTERY
CHARGE R45 D26, 27
BACK UP 10V DC-DC CONV IC1, D29, T1
RESET 2 for DISPLAY CPU X14. D25
RESET 1 for TIMER CPU X13 . D30
AFT SW
X1 ~ X12 PRE-SET CH NO. SELECTOR
03 PRESETTER
32V REG IC103
BY CTL X106
BR, BV, BU BAND SW X107, 108, 109
-26V REG X112, 113
AFC CTL X110, 111
TM ON REG CTL X104
BUFFER X102
1Hz GEN IC101
RESET X101
CH AMUNT CTL D101, 102 104
IC 102
400 KHz OSC CF101
04 TIMER
18 TUNER / IF
VHF UHF COMBINATION TUNER
5.5MHz TRAP
33.4 MHz TRAP
AFC
IF AGC
RF AGC
HLB 1 38.5MHz
3RD IF AMP
2ND IF AMP
1ST IF AMP
BUFFER
LOW LEVEL DETEC-TOR
5.5MHz SOUND DETECTOR
IC1
BUFFER X3, 4
VIDEO EQ AMP X1
SYNC SEP X8, 9
AUDIO MUTE X5, 6
SOUND AMP
SOUND DETEC-TOR
LIMITER AMP
IC2
5.5MHz BPF CF1
RF OUT
RF IN
MIXER
DIVIDER
RF AMP
ANT IN
MIX BOOSTER
VOLTAGE SELECTOR
P SW
AC IN
CONNECTOR PANEL
POWER TRANS
to VCR
VIDEO OUT
AUDIO OUT
CHG & BATT SW
TIMER SET
GND
12 V
01 REGULATOR
19 V RECTIFIER D1
16.5V RECTIFIER D2
12V REG ERROR AMP X2,3 D8
10 V REG IC1
40 V RECTIFIER D3
40 V REG X4. D4,5
CHG CTL RY 1
TIMER CTL SW X1 . D7
10 UFR
08 POWER SUB
09 POWER SUB
TM CTL
TM SET
AL12V
GND
12 V

VOLTAGE SELECTOR	
110 V	②-④ ⑤-⑦
127 V	②-⑧ ③-⑤
220 V	⑥-⑦
240 V	⑦-⑧

5-3. OVERALL WIRING-2 (EK)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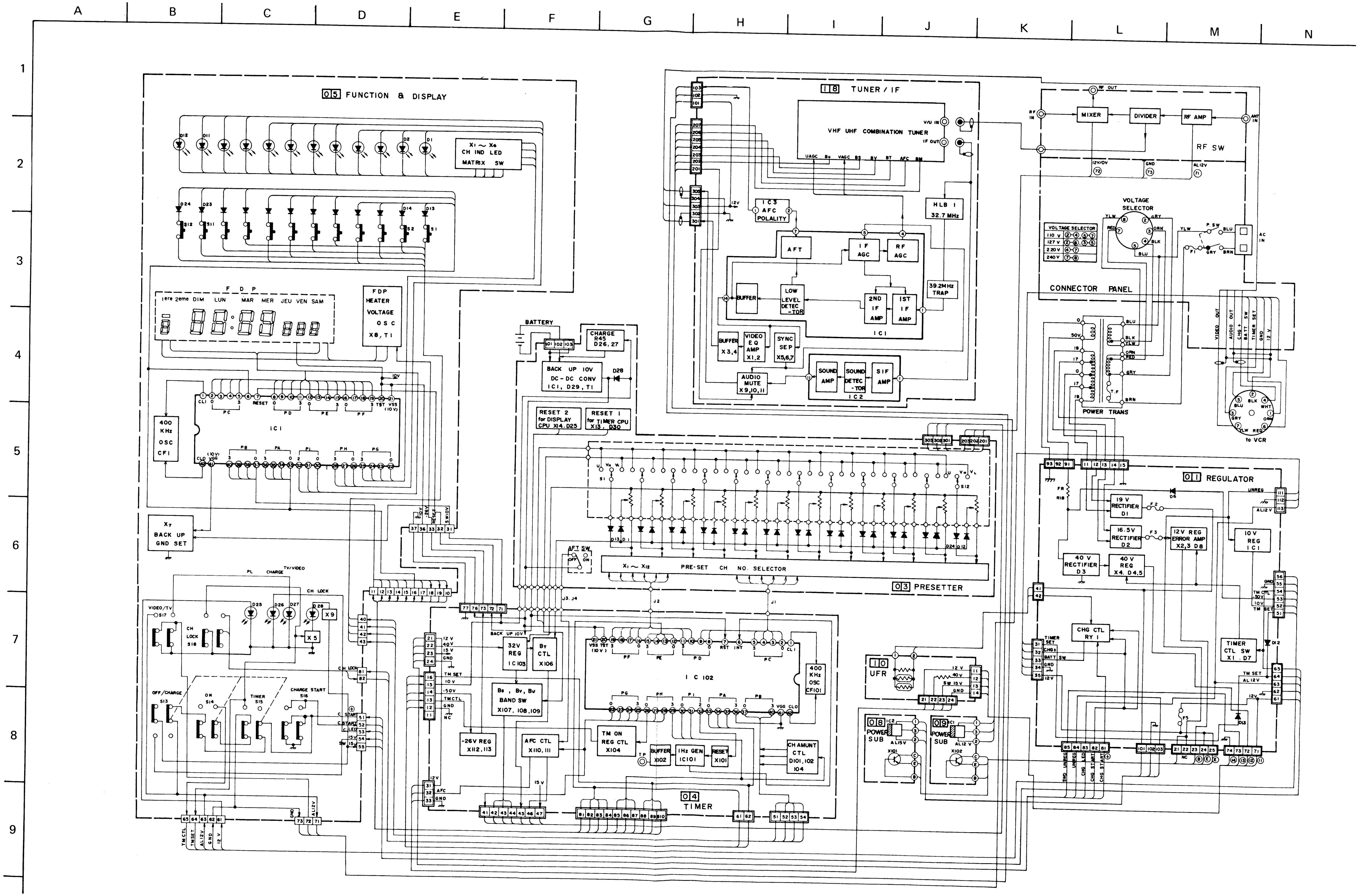
05 FUNCTION & DISPLAY
X1 ~ X4 CH IND LED MATRIX SW
F D P
FDP HEATER VOLTAGE OSC X8, T1
IC1
400 KHz OSC CF1
X7 BACK UP GND SET
PL
CHARGE
CH LOCK
CH LOCK S18
OFF/CHARGE S13
ON S14
TIMER S15
CHARGE START S16
BATTERY
CHARGE R45 D26, 27
BACK UP 10V DC-DC CONV IC1, D29, T1
D28
RESET 2 for DISPLAY CPU X14, D25
RESET 1 for TIMER CPU X13, D30
AFT SW
X1 ~ X12 PRE-SET CH NO. SELECTOR
03 PRESETTER
32V REG IC103
BT CTL X106
I C 102
400 KHz OSC CF101
-26V REG X112, 113
AFC CTL X110, 111
TM ON REG CTL X104
BUFFER X102
1Hz GEN IC101
RESET X101
CH AMUNT CTL D101, 102 104
04 TIMER
18 TUNER / IF
UHF TUNER
6 MHz TRAP
33.5 MHz TRAP
HLB 1 39.5MHz
AFC
IF AGC
RF AGC
BUFFER
LOW LEVEL DETEC-TOR
3RD IF AMP
2ND IF AMP
1ST IF AMP
6 MHz SOUND DETECTOR
IC1
BUFFER X3, 4
VIDEO EQ AMP X1
SYNC SEP X8, 9
AUDIO MUTE X5, 6
SOUND AMP
SOUND DETEC-TOR
LIMITER AMP
IC2
6 MHz BPF CF1
10 UFR
08 POWER SUB
09 POWER SUB
RF OUT
RF IN
MIXER
DIVIDER
RF AMP
ANT IN
MIX BOOSTER
VOLTAGE SELECTOR
P SW
AC IN
CONNECTOR PANEL
POWER TRANS
to VCR
01 REGULATOR
19 V RECTIFIER D1
16.5V RECTIFIER D2
12V REG ERROR AMP X2, 3 D8
10V REG IC1
40 V RECTIFIER D3
40 V REG X4, D4, 5
CHG CTL RY 1
TIMER CTL SW X1, D7

VOLTAGE SELECTOR	
110 V	②-④, ⑤-⑦
127 V	②-⑥, ③-⑤
220 V	④-⑦
240 V	⑦-⑧

5-4. OVERALL WIRING-2 (S)



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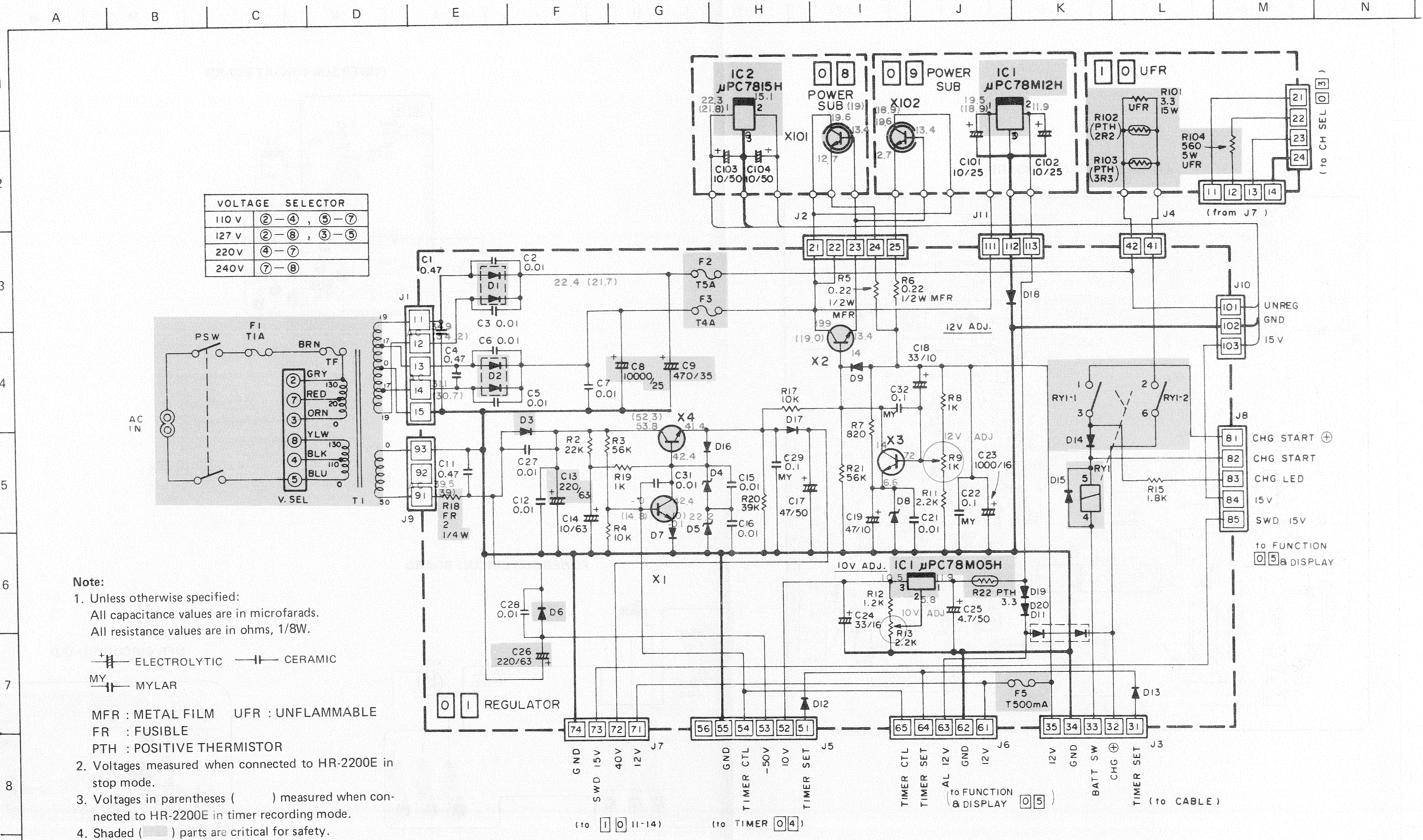
05 FUNCTION & DISPLAY
X1 ~ X4 CH IND LED MATRIX SW
FDP HEATER VOLTAGE OSC X8, T1
F D P
1ere 2eme DIM LUN MAR MER JEU VEN SAM
400 KHz OSC CF1
IC1
X7 BACK UP GND SET
VIDEO/TV S17
CH LOCK S18
OFF/CHARGE S13
ON S14
TIMER S15
CHARGE START S16
X5
X9
BATTERY
CHARGE R45 D26, 27
BACK UP 10V DC-DC CONV IC1, D29, T1
D28
RESET 2 for DISPLAY CPU X14, Q25
RESET 1 for TIMER CPU X13, D30
AFT SW
X1 ~ X12 PRE-SET CH NO. SELECTOR
03 PRESETTER
18 TUNER / IF
VHF UHF COMBINATION TUNER
IC3 AFC POLALITY
HLB 1 32.7 MHz
AFT
IF AGC
RF AGC
39.2MHz TRAP
BUFFER
LOW LEVEL DETEC -TOR
2ND IF AMP
1ST IF AMP
IC1
BUFFER X3, 4
VIDEO EQ AMP X1, 2
SYNC SEP X5, 6, 7
AUDIO MUTE X9, 10, 11
SOUND AMP
SOUND DETEC -TOR
SIF AMP
IC2
RF IN
RF OUT
MIXER
DIVIDER
RF AMP
ANT IN
RF SW
VOLTAGE SELECTOR
110 V
127 V
220 V
240 V
AC IN
P SW
F1
CONNECTOR PANEL
VIDEO OUT
AUDIO OUT
CHG
BATT SW
TIMER SET
GND
12 V
POWER TRANS
to VCR
01 REGULATOR
19 V RECTIFIER D1
16.5V RECTIFIER D2
12V REG ERROR AMP X2, 3 D8
10 V REG IC1
40 V RECTIFIER D3
40 V REG X4, D4, 5
CHG CTL RY 1
TIMER CTL SW X1 D7
10 UFR
08 POWER SUB
09 POWER SUB
32V REG IC103
BT CTL X106
BS, BV, BU BAND SW X107, 108, 109
-26V REG X112, 113
AFC CTL X110, 111
TM ON REG CTL X104
BUFFER X102
1Hz GEN IC101
RESET X101
CH AMUNT CTL D101, 102 104
I C 102
400 KHz OSC CF101
04 TIMER

5-5. REGULATOR SCHEMATIC DIAGRAM (EG/EK/S)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9
IC2 μPC7815H
22.3 (21.8)
15.1
C103 10/50
C104 10/50
0 8 POWER SUB
X101
19.6
13.4
12.7
0 9 POWER SUB
X102
(18.9)
19.6
13.4
12.7
IC1 μPC78M12H
19.5 (18.9)
11.9
C101 10/25
C102 10/25
1 0 UFR
R101 3.3 15W
R102 (PTH 2R2)
R103 (PTH 3R3)
R104 560 5W UFR
21
22
23
24
(to CH SEL 0 3)
11 12 13 14
(from J7)
J2
J11
J4
21 22 23 24 25
111 112 113
42 41
C1 0.47
C2 0.01
D1
C3 0.01
C6 0.01
D2
C4 0.47
C5 0.01
22.4 (21.7)
F2 T5A
F3 T4A
R5 0.22 1/2W
R6 0.22 1/2W MFR
D18
MFR
X2
(19.0)
13.4
14
D9
12V ADJ.
C18 33/10
C8 10000/25
C9 470/35
C7 0.01
J1
PSW
F1 T1A
BRN
TF
GRY
RED
ORN
YLW
BLK
BLU
V. SEL
T1
AC IN
J9
93
92
91
C11 0.47
R18 FR 2 1/4W
D3
C27 0.01
R2 22K
R3 56K
X4
(52.3) 53.8
41.4
42.4
D16
R17 10K
D17
C29 0.1 MY
C17 47/50
C13 220/63
R19 1K
C31 0.01
D4
C15 0.01
R20 39K
C16 0.01
C12 0.01
C14 10/63
R4 10K
X1
D7
D5
C32 0.1 MY
R8 1K
R7 820
X3
R9 1K
12V ADJ
C23 1000/16
R21 56K
6.6
R11 2.2K
C22 0.1 MY
D8
C19 47/10
C21 0.01
10V ADJ.
IC1 μPC78M05H
R12 1.2K
C24 33/16
R13 2.2K
10V ADJ
C25 4.7/50
R22 PTH 3.3
D19
D20
D11
C28 0.01
D6
C26 220/63
F5 T500mA
D12
D13
0 1 REGULATOR
RY1-1
RY1-2
RY1
D14
D15
R15 1.8K
J10
101 UNREG
102 GND
103 15V
J8
81 CHG START ⊕
82 CHG START
83 CHG LED
84 15V
85 SWD 15V
to FUNCTION 0 5 & DISPLAY
74 73 72 71
J7
GND
SWD 15V
40V
12V
(to 1 0 11-14)
56 55 54 53 52 51
J5
GND
TIMER CTL
-50V
10V
TIMER SET
(to TIMER 0 4)
65 64 63 62 61
J6
TIMER CTL
TIMER SET
AL 12V
GND
12V
(to FUNCTION & DISPLAY 0 5)
35 34 33 32 31
J3
12V
GND
BATT SW
CHG ⊕
TIMER SET
(to CABLE)

VOLTAGE SELECTOR	
110 V	②—④ , ⑤—⑦
127 V	②—⑧ , ③—⑤
220 V	④—⑦
240 V	⑦—⑧

Note:

1. Unless otherwise specified:
   All capacitance values are in microfarads.
   All resistance values are in ohms, 1/8W.

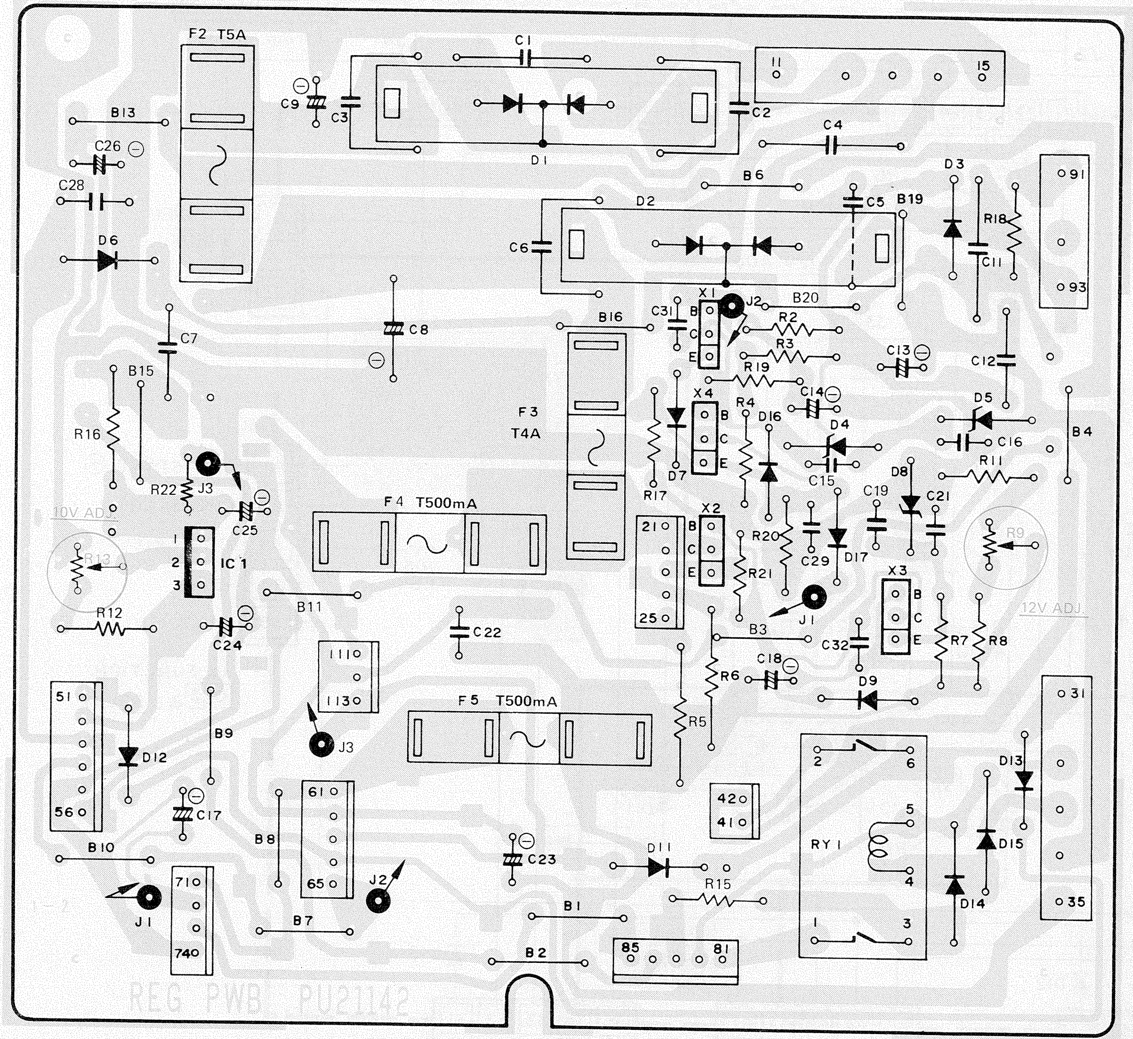
   ELECTROLYTIC　　CERAMIC

   MY MYLAR

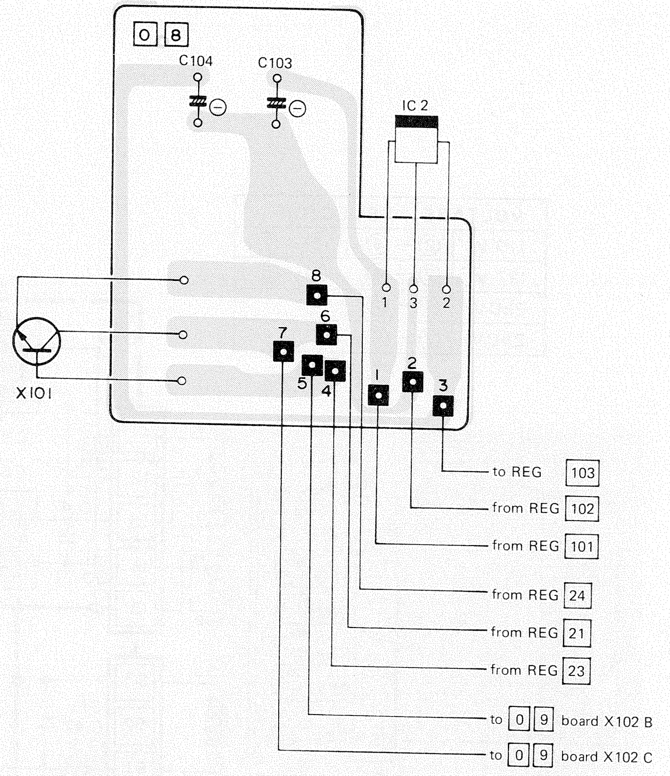
   MFR : METAL FILM　　UFR : UNFLAMMABLE
   FR : FUSIBLE
   PTH : POSITIVE THERMISTOR
2. Voltages measured when connected to HR-2200E in stop mode.
3. Voltages in parentheses ( ) measured when connected to HR-2200E in timer recording mode.
4. Shaded ( ) parts are critical for safety.
   Replace only with specified part numbers.
5. D1 : 30DC2 or SS-3
   D2 : SS-5
   D3,19,20 : 10E2
   D4 : HZ-20-2L
   D5 : HZ-22-2L
   D7,9,16,17,18 : MA171
   D12,13 : MA150
   D8 : RD6.8EB
   D6,14,15 : 10E2
   D11 : 10E1S
   X1,2 : 2SD639S
   X3 : 2SD637R
   X4 : 2SD1128-04
   X101,102 : 2SC2577Y

5-6. REGULATOR AND POWER SUB CIRCUIT BOARDS (EG/EK/S)

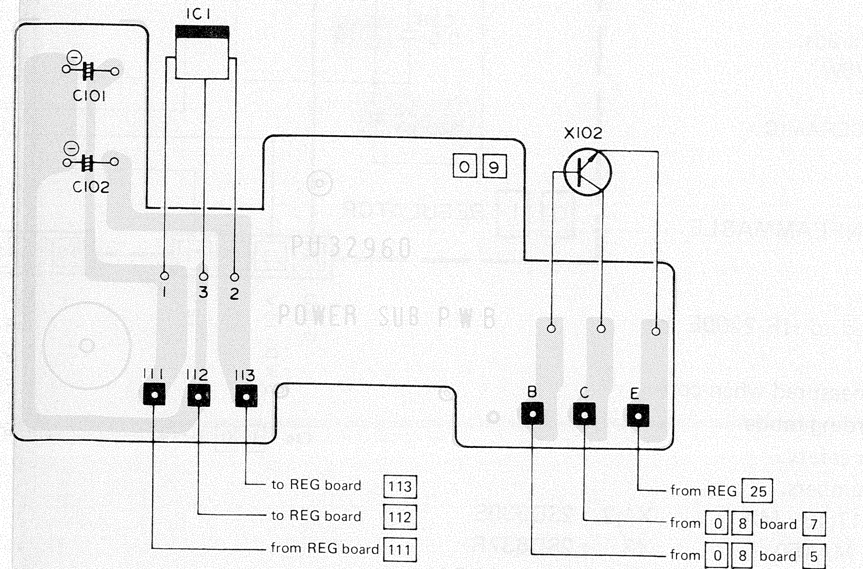
REGULATOR CIRCUIT BOARD


F2 T5A
C1
C9
C3
C2
D1
11
15
B13
C26
C28
D6
C4
D3
B6
C5
B19
D2
C6
91
93
R18
C11
C7
C8
X1
C31
J2
B20
R2
R3
R19
B16
C13
C12
B15
R16
F3
T4A
X4
R4
D16
C14
D5
C16
D4
B4
D7
R17
R11
D8
C15
C19
C21
10V ADJ
R13
R22
J3
C25
F4 T500mA
X2
R9
IC1
21
25
R20
R21
D17
C29
J1
X3
R12
C24
B11
C22
B3
C32
R7
R8
12V ADJ
111
113
R6
C18
D9
51
56
D12
F5 T500mA
R5
31
J3
B9
D13
C17
61
65
42
41
RY1
B10
B8
C23
D11
D15
J1
71
74
B7
J2
R15
B1
D14
35
B2
85
81
REG PWB PU21142

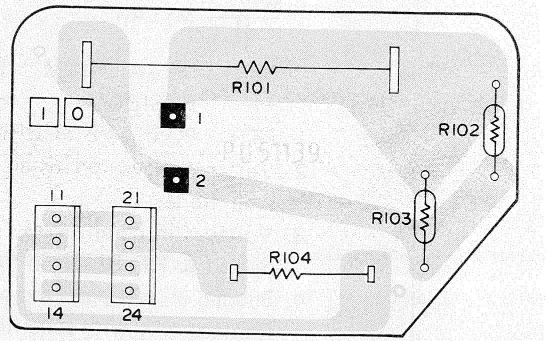
POWER SUB CIRCUIT BOARD


08
C104
C103
IC2
8
6
7
5
4
1
2
3
1
3
2
X101
to REG 103
from REG 102
from REG 101
from REG 24
from REG 21
from REG 23
to 09 board X102 B
to 09 board X102 C

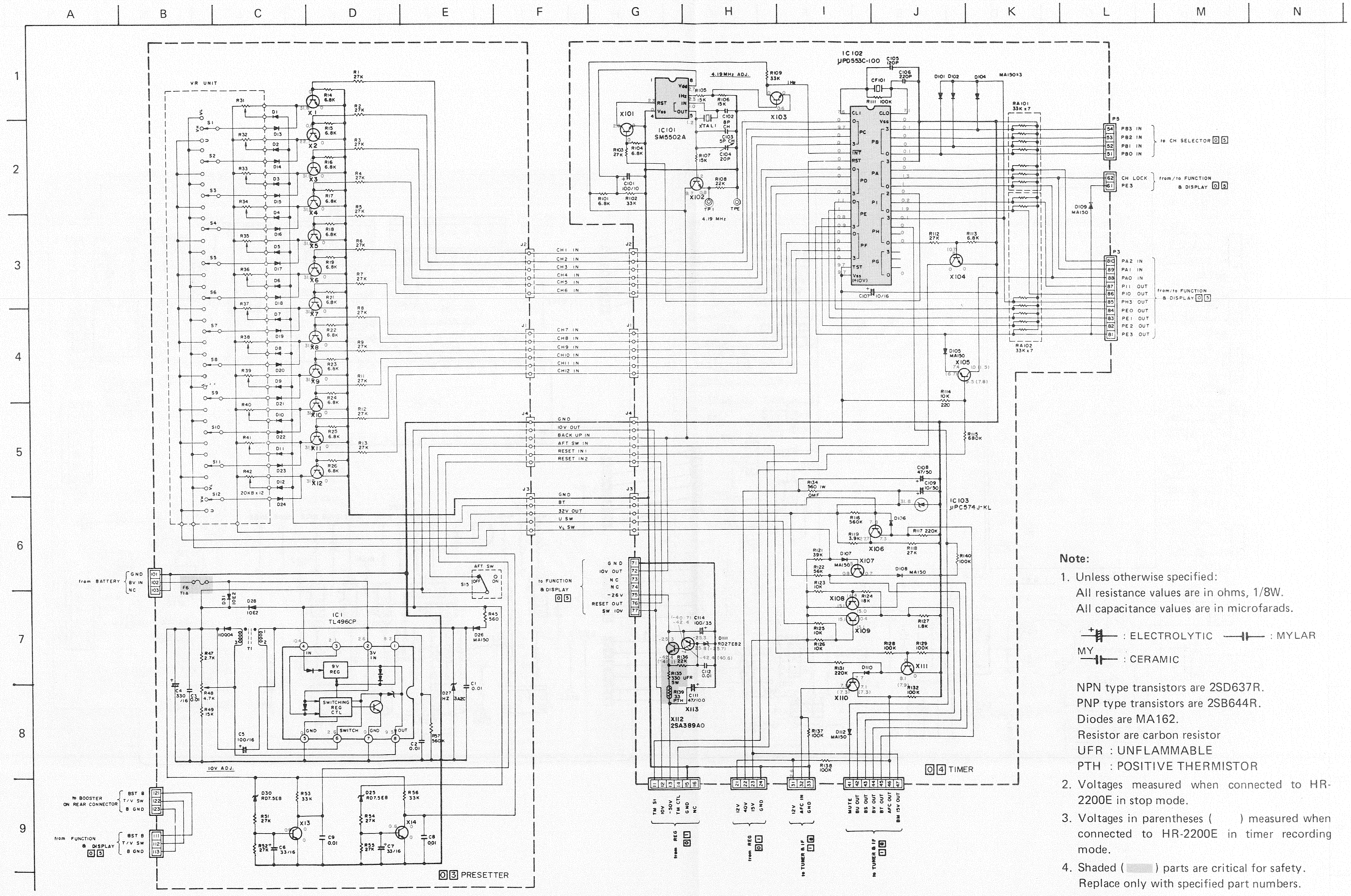
POWER SUB CIRCUIT BOARD


IC1
C101
C102
X102
09
PU32960
POWER SUB PWB
1
3
2
111
112
113
B
C
E
to REG board 113
to REG board 112
from REG board 111
from REG 25
from 08 board 7
from 08 board 5

UFR CIRCUIT BOARD


R101
10
1
2
PU51139
R102
R103
11
21
R104
14
24

5-7. PRESETTER AND TIMER SCHEMATIC DIAGRAMS-1 (EG/S)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
VR UNIT
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
20KB x 12
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
R1 27K
R14 6.8K
J2
J1
J4
J3
CH1 IN
CH2 IN
CH3 IN
CH4 IN
CH5 IN
CH6 IN
CH7 IN
CH8 IN
CH9 IN
CH10 IN
CH11 IN
CH12 IN
GND
10V OUT
BACK UP IN
AFT SW IN
RESET IN1
RESET IN2
GND
BT
32V OUT
U SW
VL SW
from BATTERY
GND
BV IN
NC
F6 T1A
AFT SW
S15
OFF
ON
IC1
TL496CP
9V REG
SWITCHING REG CTL
SWITCH
IN
3V IN
GND
OUT
10V ADJ.
to BOOSTER ON REAR CONNECTOR
BST B
T/V SW
B GND
from FUNCTION & DISPLAY 05
X13
X14
D30 RD7.5EB
D25 RD7.5EB
03 PRESETTER
4.19MHz ADJ.
IC101
SM5502A
X101
X102
X103
XTAL1
TP1
TPE
4.19 MHz
IC102
μPD553C-100
CF101
CL1
CLO
PC
PB
PA
PD
PE
PF
PG
PH
P1
INT
RST
TST
Vss (+10V)
C107 10/16
D101 D102 D104 MA150x3
RA101 33Kx7
RA102 33Kx7
P5
PB3 IN
PB2 IN
PB1 IN
PB0 IN
to CH SELECTOR 05
CH LOCK
PE3
from/to FUNCTION & DISPLAY 05
D109 MA150
P3
PA2 IN
PA1 IN
PA0 IN
P11 OUT
P10 OUT
PH3 OUT
PE0 OUT
PE1 OUT
PE2 OUT
PE3 OUT
from/to FUNCTION & DISPLAY 05
X104
X105
D105 MA150
to FUNCTION & DISPLAY 05
GND
10V OUT
NC
NC
-26V
RESET OUT
SW 10V
IC103
μPC574J-KL
X106
X107
X108
X109
X110
X111
X112 2SA389A0
X113
D111 RD27EB2
UFR
PTH
04 TIMER
TM SI
10V
30V
TM CTL
GND
NC
12V
40V
15V
GND
12V
AFC IN
GND
MUTE
BU OUT
BS OUT
BV OUT
BT OUT
AFC OUT
BM 15V OUT
from REG 01
from REG 01
to TUNER & IF 16
to TUNER & IF 16

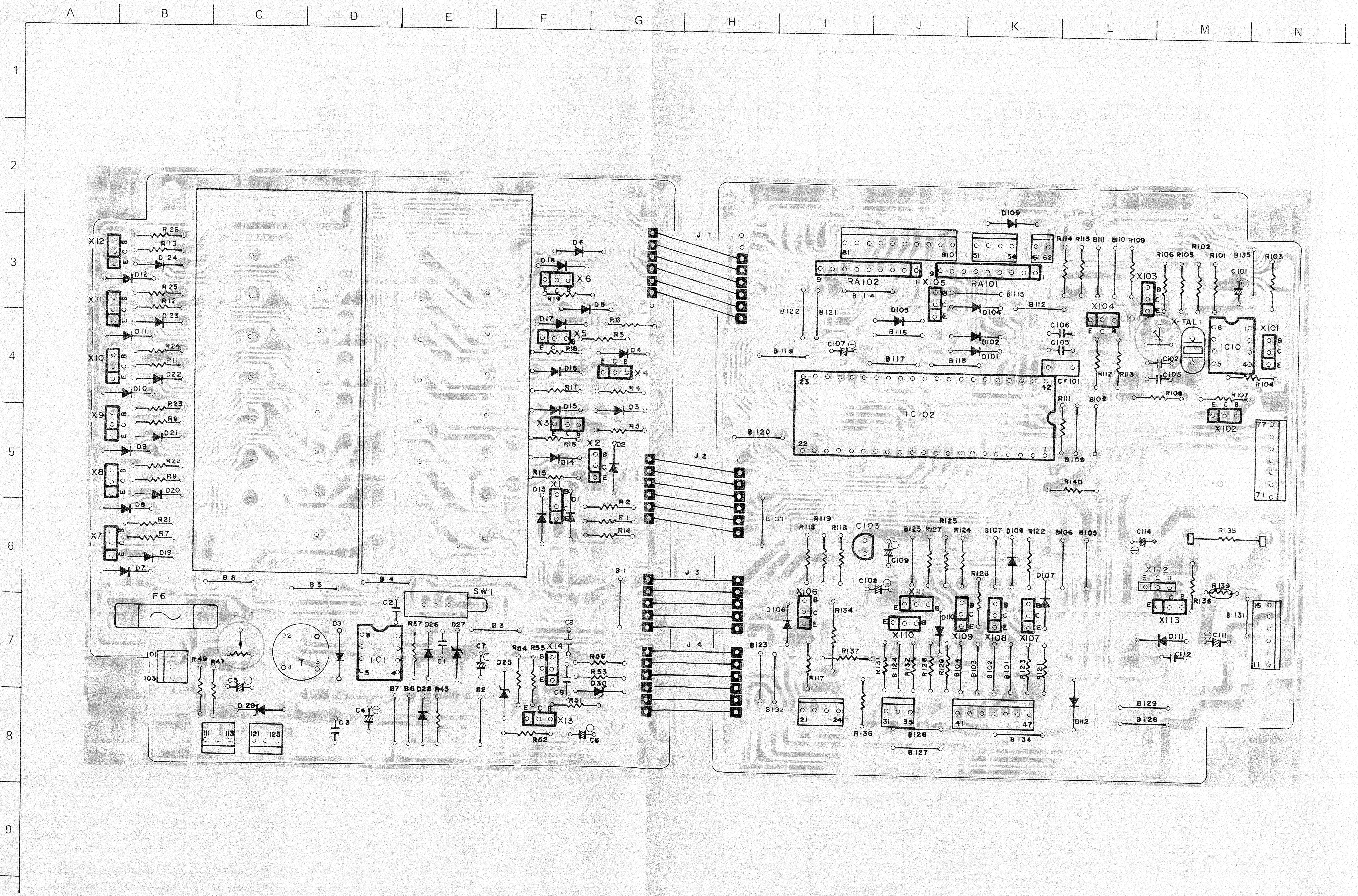
Note:

1. Unless otherwise specified:
   All resistance values are in ohms, 1/8W.
   All capacitance values are in microfarads.

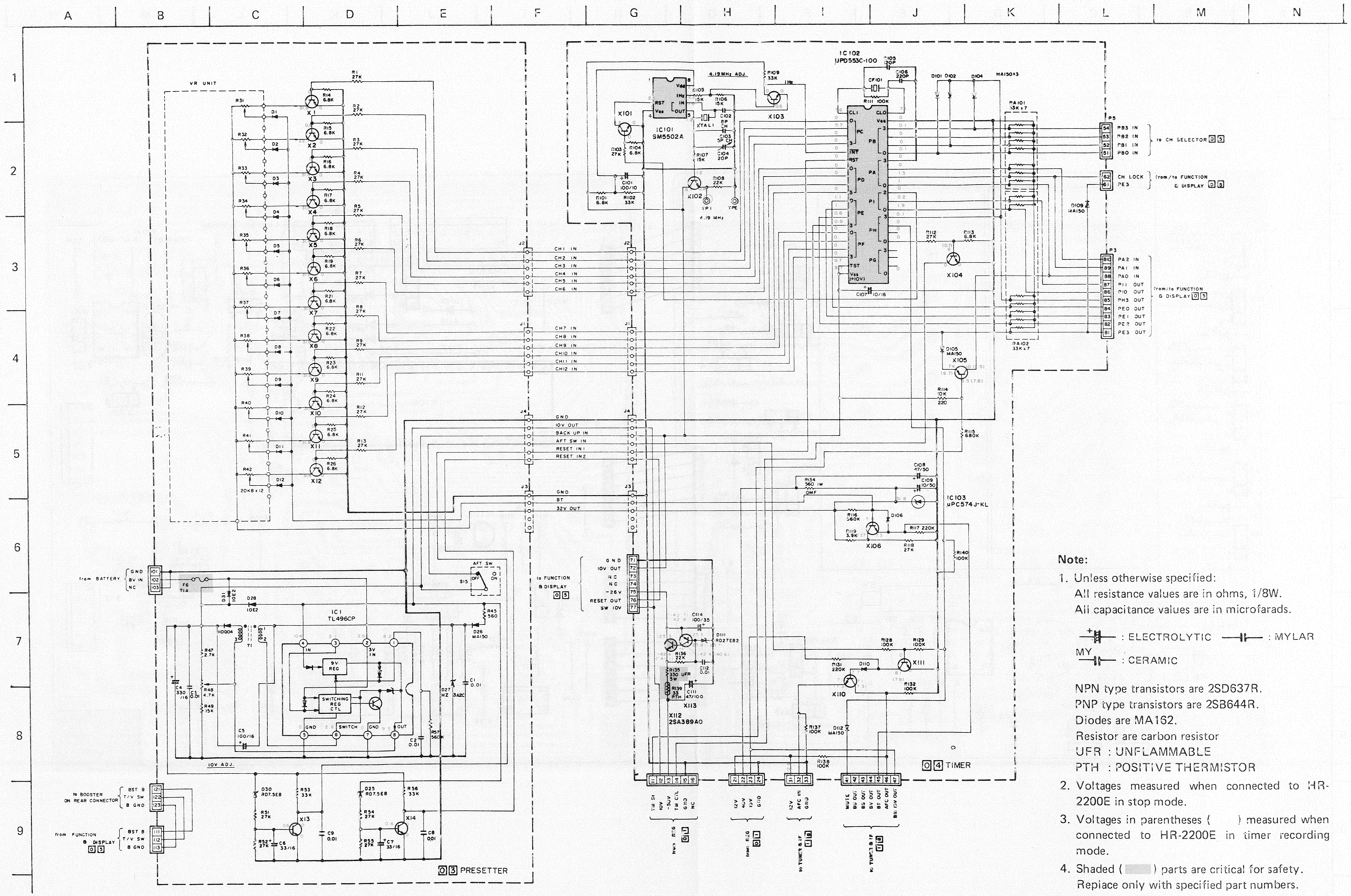
   ⊣⊢ : ELECTROLYTIC ⊣⊢ : MYLAR
   MY
   ⊣⊢ : CERAMIC

   NPN type transistors are 2SD637R.
   PNP type transistors are 2SB644R.
   Diodes are MA162.
   Resistor are carbon resistor
   UFR : UNFLAMMABLE
   PTH : POSITIVE THERMISTOR
2. Voltages measured when connected to HR-2200E in stop mode.
3. Voltages in parentheses ( ) measured when connected to HR-2200E in timer recording mode.
4. Shaded (▨) parts are critical for safety. Replace only with specified part numbers.

5-8. PRESETTER AND TIMER CIRCUIT BOARDS-1 (EG/S)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
TIMER & PRE SET PWB
PU10400
ELNA-
F45 94V-0
J1
J2
J3
J4
F6
R48
T1
SW1
IC1
IC101
IC102
IC103
RA101
RA102
X-TAL1
TP-1
CF101

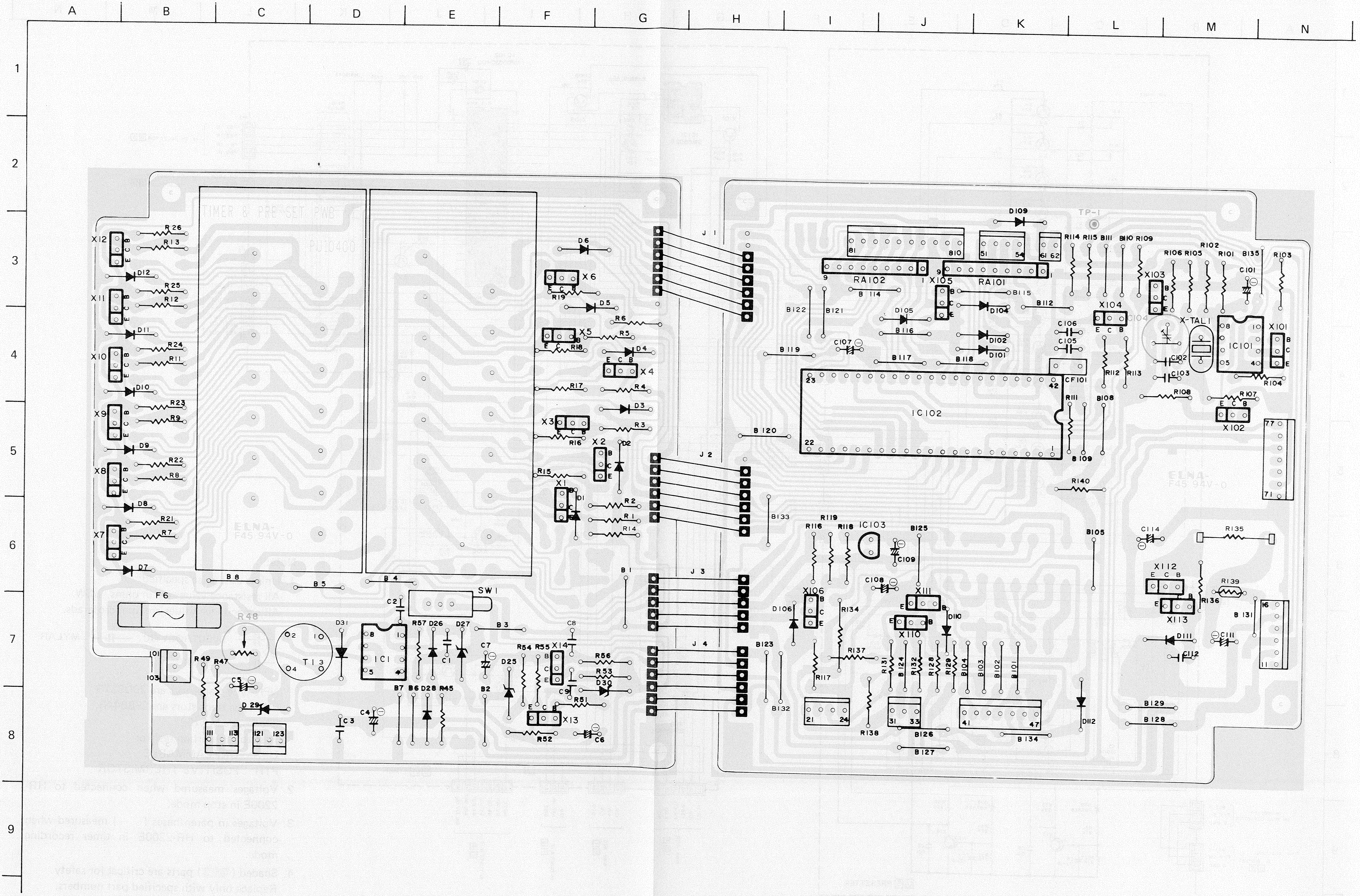
5-9. PRESETTER AND TIMER SCHEMATIC DIAGRAMS-2 (EK)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
VR UNIT
20KB x 12
IC102
µPD553C-100
IC101
SM5502A
4.19MHz ADJ.
X101
X102
X103
X104
X105
X106
IC103
µPC574J-KL
IC1
TL496CP
9V REG
SWITCHING REG CTL
AFT SW
from BATTERY
GND
8V IN
NC
F6 T1A
10V ADJ.
to BOOSTER ON REAR CONNECTOR
BST B
T/V SW
B GND
from FUNCTION & DISPLAY
CH1 IN
CH2 IN
CH3 IN
CH4 IN
CH5 IN
CH6 IN
CH7 IN
CH8 IN
CH9 IN
CH10 IN
CH11 IN
CH12 IN
GND
10V OUT
BACK UP IN
AFT SW IN
RESET IN1
RESET IN2
BT
32V OUT
to FUNCTION & DISPLAY
-26V
RESET OUT
SW 10V
PB3 IN
PB2 IN
PB1 IN
PB0 IN
to CH SELECTOR
CH LOCK
PE3
from/to FUNCTION & DISPLAY
PA2 IN
PA1 IN
PA0 IN
PI1 OUT
PI0 OUT
PH3 OUT
PE0 OUT
PE1 OUT
PE2 OUT
PE3 OUT
RA101 33K x 7
RA102 33K x 7
X112 2SA389A0
X113
X110
X111
X13
X14
03 PRESETTER
04 TIMER
from R.G
from R.G
to TUNER & IF
to TUNER & IF

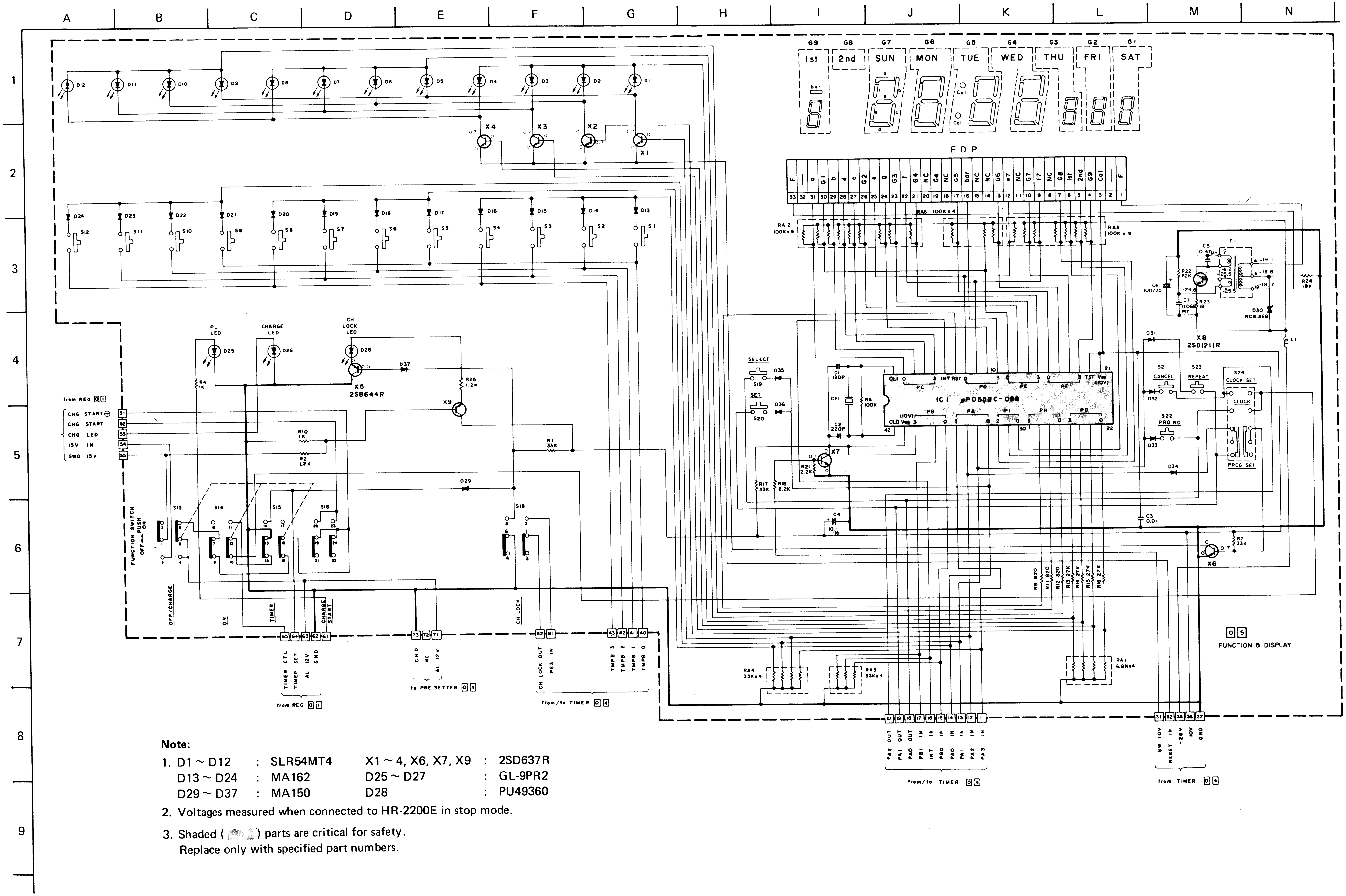
Note:

1. Unless otherwise specified:
   All resistance values are in ohms, 1/8W.
   All capacitance values are in microfarads.
   : ELECTROLYTIC : MYLAR
   MY : CERAMIC
   NPN type transistors are 2SD637R.
   PNP type transistors are 2SB644R.
   Diodes are MA162.
   Resistor are carbon resistor
   UFR : UNFLAMMABLE
   PTH : POSITIVE THERMISTOR
2. Voltages measured when connected to HR-2200E in stop mode.
3. Voltages in parentheses ( ) measured when connected to HR-2200E in timer recording mode.
4. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

5-10. PRESETTER AND TIMER CIRCUIT BOARDS-2 (EK)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
TIMER & PRE SET PWB
PJ10400
ELNA-
F45 94V-0
X12
X11
X10
X9
X8
X7
X1
X2
X3
X4
X5
X6
X13
X14
D6
D5
D4
D3
D2
D1
D7
D8
D9
D10
D11
D12
D25
D26
D27
D28
D29
D30
D31
R26
R13
R25
R12
R24
R11
R23
R9
R22
R8
R21
R7
R1
R2
R3
R4
R5
R6
R14
R15
R16
R17
R18
R19
R45
R47
R48
R49
R51
R52
R53
R54
R55
R56
R57
F6
SW1
T1
IC1
C1
C2
C3
C4
C5
C6
C7
C8
C9
J1
J2
J3
J4
B1
B2
B3
B4
B5
B6
B7
B8
D109
TP-1
RA102
RA101
X101
X102
X103
X104
X105
X106
X110
X111
X112
X113
IC101
IC102
IC103
CF101
X-TAL1
C101
C102
C103
C104
C105
C106
C107
C108
C109
C111
C112
C114
D101
D102
D104
D105
D106
D110
D111
D112
R101
R102
R103
R104
R105
R106
R107
R108
R109
R111
R112
R113
R114
R115
R116
R117
R118
R119
R128
R129
R131
R132
R134
R135
R136
R137
R138
R139
R140
B101
B102
B103
B104
B105
B108
B109
B110
B111
B112
B114
B115
B116
B117
B118
B119
B120
B121
B122
B123
B124
B125
B126
B127
B128
B129
B131
B132
B133
B134
B135
ELNA-
F45 94V-0

5-11. FUNCTION AND DISPLAY SCHEMATIC DIAGRAM (EG/EK)

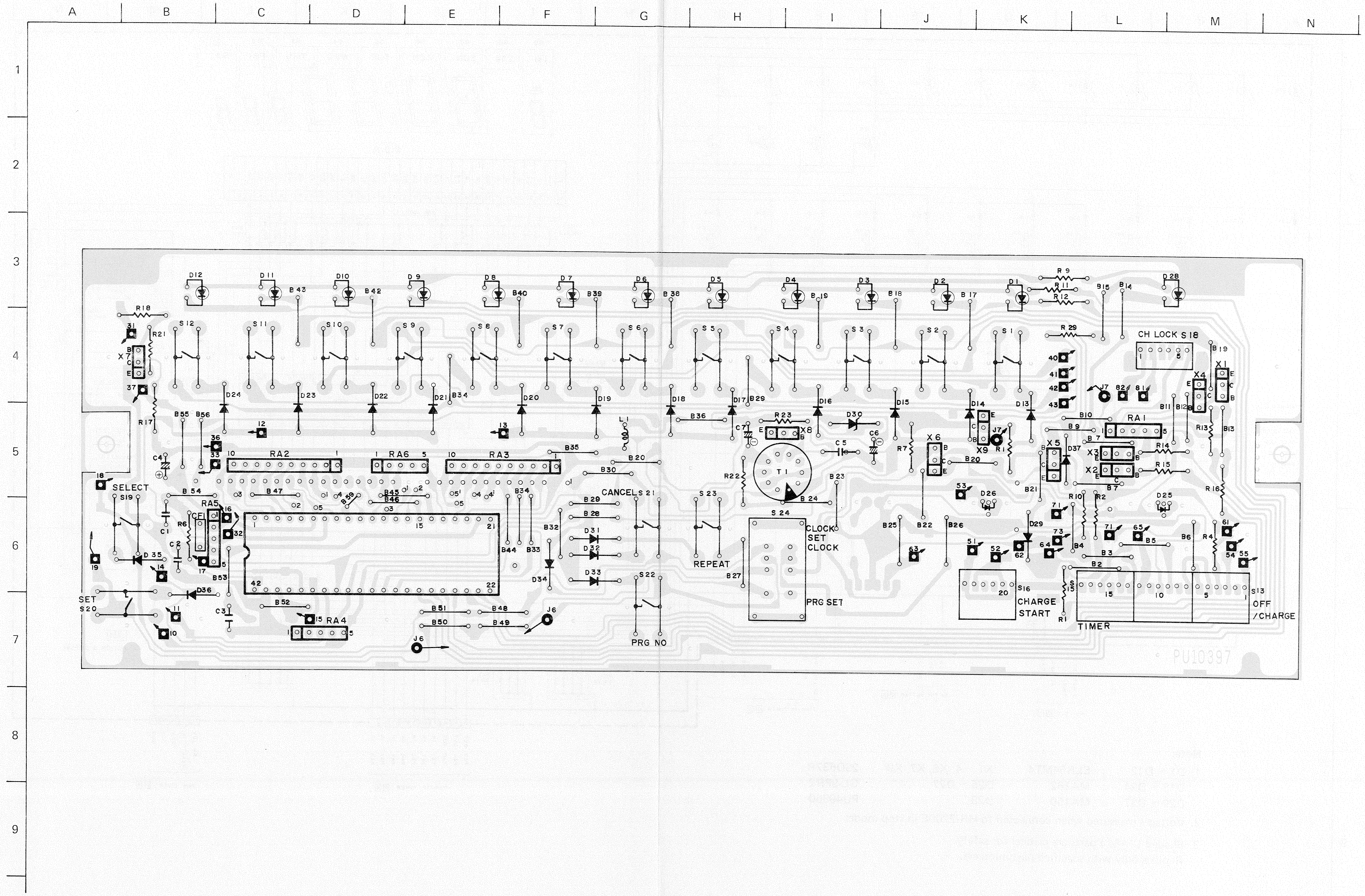


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
G9
G8
G7
G6
G5
G4
G3
G2
G1
1st
2nd
SUN
MON
TUE
WED
THU
FRI
SAT
FDP
X1
X2
X3
X4
X5
2SB644R
X6
X7
X8
2SD1211R
X9
PL LED
CHARGE LED
CH LOCK LED
IC1 µPD552C-068
SELECT
SET
CANCEL
REPEAT
CLOCK SET
CLOCK
PRG NO
PROG SET
FUNCTION SWITCH
PUSH ON
OFF/CHARGE
ON
TIMER
CHARGE START
CH LOCK
from REG 01
CHG START
CHG START
CHG LED
15V IN
SWD 15V
TIMER CTL
TIMER SET
AL 12V
GND
from REG 01
to PRE SETTER 03
CH LOCK OUT
PE3 IN
from/to TIMER 04
TMPB 3
TMPB 2
TMPB 1
TMPB 0
from/to TIMER 04
from TIMER 04
05
FUNCTION & DISPLAY

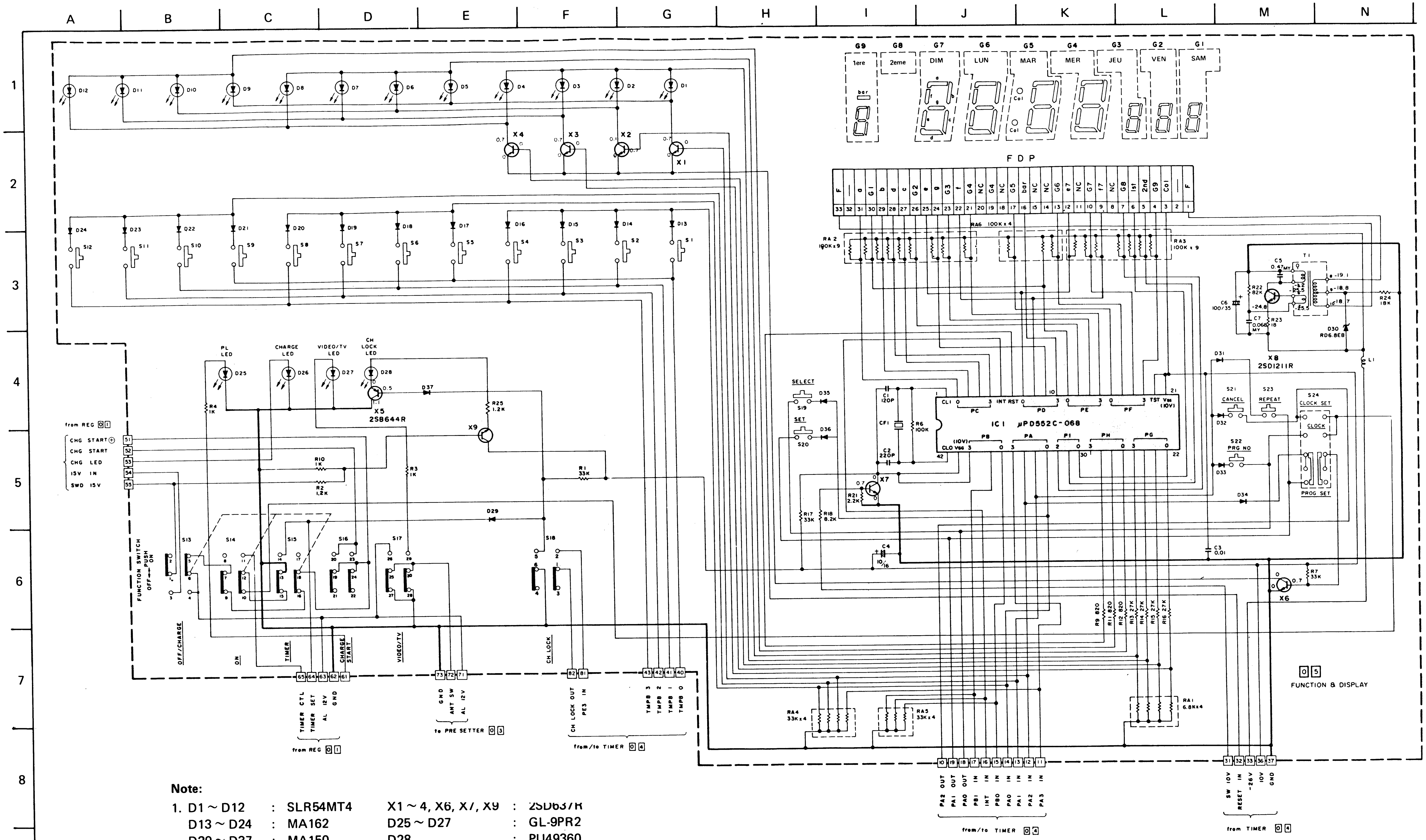
Note:

1. D1 ~ D12 : SLR54MT4 X1 ~ 4, X6, X7, X9 : 2SD637R
   D13 ~ D24 : MA162 D25 ~ D27 : GL-9PR2
   D29 ~ D37 : MA150 D28 : PU49360
2. Voltages measured when connected to HR-2200E in stop mode.
3. Shaded (▨) parts are critical for safety.
   Replace only with specified part numbers.

5-12. FUNCTION AND DISPLAY CIRCUIT BOARD (EG/EK)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
D12
D11
D10
D9
D8
D7
D6
D5
D4
D3
D2
D1
D28
B43
B42
B40
B39
B38
B19
B18
B17
B15
B14
R9
R11
R12
R18
R21
R29
S12
S11
S10
S9
S8
S7
S6
S5
S4
S3
S2
S1
CH LOCK S18
X7
X1
X4
X5
X6
X8
X9
X2
X3
D24
D23
D22
D21
D20
D19
D18
D17
D16
D15
D14
D13
D30
B34
B29
B36
B55
B56
R17
L1
R23
C7
C6
C5
R7
R1
D37
RA1
B10
B9
B7
B11
B12
R13
B13
R14
R15
R16
C4
RA2
RA6
RA3
B35
B20
B30
T1
B23
B24
R22
SELECT
S19
B54
B47
B45
B46
B59
B44
B33
B32
CANCEL S21
S23
S24
CLOCK SET
CLOCK
B25
B22
B26
B21
D26
D25
R10
R2
B8
B4
B3
B2
B5
B6
R4
D29
C1
C2
R6
CF1
RA5
D35
D36
B53
C3
B52
RA4
B51
B50
B48
B49
J6
J7
D31
D32
D33
D34
B28
B27
S22
REPEAT
PRG NO
PRG SET
S16
CHARGE START
R15
R1
TIMER
S13
OFF /CHARGE
SET
S20
10
11
12
13
14
15
16
17
18
19
31
32
33
36
37
40
41
42
43
51
52
53
54
55
61
62
63
64
65
71
72
73
81
82
PU10397

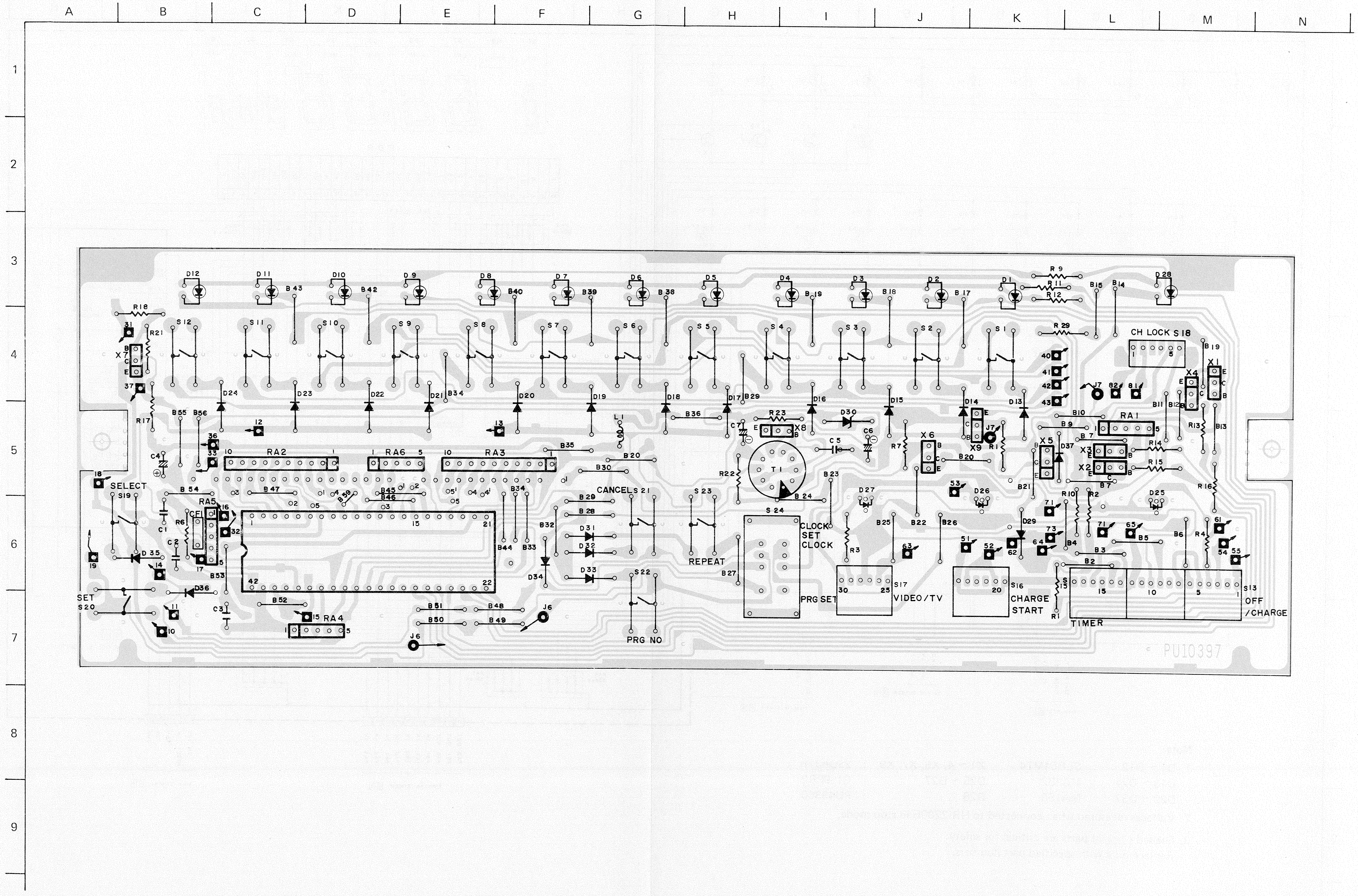
5-13. FUNCTION AND DISPLAY SCHEMATIC DIAGRAM (S)


A B C D E F G H I J K L M N
1 2 3 4 5 6 7 8 9
D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12
X1 X2 X3 X4
D13 D14 D15 D16 D17 D18 D19 D20 D21 D22 D23 D24
S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12
G9 G8 G7 G6 G5 G4 G3 G2 G1
1ere 2eme DIM LUN MAR MER JEU VEN SAM
bar Col
F D P
RA6 100K x 4
RA2 100K x 9
RA3 100K x 9
PL LED D25
CHARGE LED D26
VIDEO/TV LED D27
CH LOCK LED D28
X5 2SB644R
D37
R25 1.2K
X9
R4 1K
from REG 01
CHG START⊕ 51
CHG START 52
CHG LED 53
15V IN 54
SWD 15V 55
R10 1K
R2 1.2K
R3 1K
R1 33K
D29
FUNCTION SWITCH PUSH ON OFF
S13 S14 S15 S16 S17 S18
OFF/CHARGE ON TIMER CHARGE START VIDEO/TV CH LOCK
65 64 63 62 61
TIMER CTL TIMER SET AL 12V GND
from REG 01
73 72 71
GND ANT SW AL 12V
to PRE SETTER 03
82 81
CH LOCK OUT PE3 IN
43 42 41 40
TMPB 3 TMPB 2 TMPB 1 TMPB 0
from/to TIMER 04
SELECT S19 D35
SET S20 D36
C1 120P
CF1
R6 100K
C2 220P
IC1 µPD552C-068
CL1 INT RST PC PD PE PF TST VSS (10V)
PB PA PI PH PG
CL0 VGG (10V)
X7
R21 2.2K
R17 33K
R18 8.2K
C4 10/16
C5 0.4 MY
T1
R22 82K
C6 100/35
C7 0.068 MY
R23 18
R24 18K
D30 RD6.8EB
D31
X8 2SD1211R
L1
S21 CANCEL
S23 REPEAT
S24 CLOCK SET
CLOCK
S22 PRG NO
PROG SET
D32 D33 D34
C3 0.01
R7 33K
X6
R9 820 R11 820 R12 820 R13 27K R14 27K R15 27K R16 27K
RA1 6.8K x 4
RA4 33K x 4
RA5 33K x 4
05 FUNCTION & DISPLAY
10 19 18 17 16 15 14 13 12 11
PA2 OUT PA1 OUT PA0 OUT PB1 IN INT PB0 IN PA0 IN PA1 IN PA2 IN PA3 IN
from/to TIMER 04
31 32 33 36 37
SW 10V RESET IN -26V 10V GND
from TIMER 04

Note:

1. D1 ~ D12 : SLR54MT4 X1 ~ 4, X6, X7, X9 : 2SD637R
   D13 ~ D24 : MA162 D25 ~ D27 : GL-9PR2
   D29 ~ D37 : MA150 D28 : PU49360
2. Voltages measured when connected to HR-2200E in stop mode.
3. Shaded (▨) parts are critical for safety.
   Replace only with specified part numbers.

5-14. FUNCTION AND DISPLAY CIRCUIT BOARD (S)


A
B
C
D
E
F
G
H
I
J
K
L
M
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B43
B42
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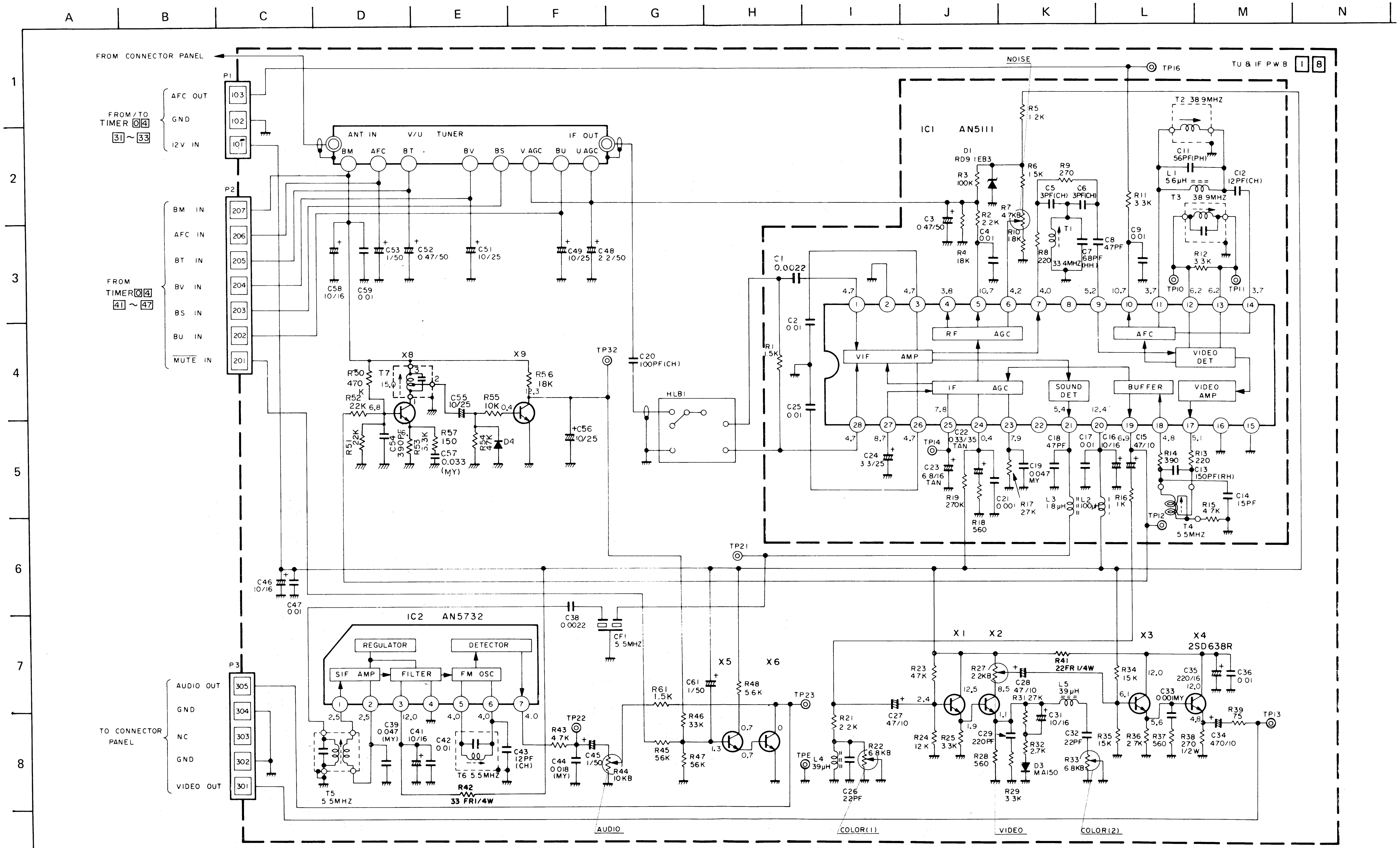
B38
B19
B18
B17
R9
R11
R12
B15
B14
R18
R21
S12
S11
S10
S9
S8
S7
S6
S5
S4
S3
S2
S1
R29
CH LOCK S18
B19
X7
X4
X1
31
37
D24
D23
D22
D21
B34
D20
D19
D18
D17
B29
D16
D30
D15
D14
D13
40
41
42
43
J7
82
81
B11
B12
R17
B55
B56
12
13
L1
B36
C7
R23
X8
C5
C6
R7
X6
X9
R1
B10
B9
RA1
R13
B13
36
33
C4
RA2
RA6
RA3
B35
B20
T1
X5
D37
B7
X3
X2
R14
R15
18
SELECT
S19
B54
B47
B45
B46
B34
B30
CANCEL S21
S23
B23
B24
R22
53
D26
B21
R10
R2
D25
R16
RA5
CF1
R6
C1
C2
16
32
B29
B28
D31
D32
D33
B32
B44
B33
S24
CLOCK SET CLOCK
B25
B22
B26
D27
71
73
D29
64
B4
65
B5
B6
R4
61
54
55
19
D35
14
17
B53
42
22
D34
REPEAT
B27
R3
63
51
52
62
B3
B2
S22
S17
PRG SET
VIDEO/TV
S16
CHARGE START
S15
R1
TIMER
S13
OFF /CHARGE
SET S20
D36
11
10
C3
B52
15
RA4
B51
B50
B48
B49
J6
J6
PRG NO
PU10397

5-15. TUNER & IF SCHEMATIC DIAGRAM-1 (EG)



A B C D E F G H I J K L M N
1 2 3 4 5 6 7 8 9
FROM CONNECTOR PANEL
TU & IF PWB 1 8
FROM/TO TIMER 04 31 ~ 33
AFC OUT
GND
12V IN
P1 103 102 101
FROM TIMER 04 41 ~ 47
BM IN
AFC IN
BT IN
BV IN
BS IN
BU IN
MUTE IN
P2 207 206 205 204 203 202 201
ANT IN V/U TUNER IF OUT
BM AFC BT BV BS V AGC BU U AGC
C58 10/16
C59 0.01
C53 1/50
C52 0.47/50
C51 10/25
C49 10/25
C48 2.2/50
X8 X9
R50 470
T7
R56 18K
R52 22K
R51 22K
C54 390PF
R53 3.3K
C55 10/25
R55 10K
R57 150
C57 0.033 (MY)
R54 47K
D4
C56 10/25
TP32
C20 100PF(CH)
HLB1
NOISE
TP16
IC1 AN5111
D1 RD9.1EB3
R3 100K
R5 1.2K
R6 1.5K
R9 270
C5 3PF(CH)
C6 3PF(CH)
R11 3.3K
T2 38.9MHZ
C11 56PF(PH)
L1 5.6μH
C12 12PF(CH)
T3 38.9MHZ
R12 3.3K
TP10 TP11
C3 0.47/50
R2 2.2K
R7 4.7KB
R10 18K
C4 0.01
R4 18K
R8 220
T1
C7 68PF (HH)
C8 47PF
33.4MHZ
C9 0.01
C1 0.0022
C2 0.01
R1 1.5K
C25 0.01
RF AGC
AFC
VIF AMP
IF AGC
SOUND DET
BUFFER
VIDEO DET
VIDEO AMP
TP14
C22 0.33/35 TAN
C24 3.3/25
C23 6.8/16 TAN
R19 270K
R18 560
C21 0.001
R17 27K
C19 0.047 MY
C18 47PF
C17 0.01
C16 10/16
C15 47/10
L3 1.8μH
L2 100μH
R16 1K
R14 390
R13 220
C13 150PF(RH)
C14 15PF
T4 5.5MHZ
R15 4.7K
TP12
TP21
C46 10/16
C47 0.01
IC2 AN5732
REGULATOR
DETECTOR
SIF AMP
FILTER
FM OSC
C38 0.0022
CF1 5.5MHZ
X5 X6
C61 1/50
R61 1.5K
R48 5.6K
R46 33K
R45 56K
R47 56K
TP23
TP22
R43 4.7K
C44 0.018 (MY)
C45 1/50
R44 10KB
T5 5.5MHZ
C39 0.047 (MY)
C41 10/16
C42 0.01
T6 5.5MHZ
C43 12PF (CH)
R42 33 FR1/4W
P3 305 304 303 302 301
AUDIO OUT
GND
NC
GND
VIDEO OUT
TO CONNECTOR PANEL
X1 X2 X3
X4 2SD638R
R41 22FR 1/4W
R23 4.7K
R27 2.2KB
C28 47/10
L5 39μH
R31 27K
R34 15K
C35 220/16
C36 0.01
C33 0.001MY
C27 47/10
R21 2.2K
R22 6.8KB
R24 12K
R25 3.3K
C29 220PF
C31 10/16
R32 2.7K
D3 MA150
C32 22PF
R35 15K
R36 2.7K
R37 560
R38 270 1/2W
R39 75
C34 470/10
TP13
TPE
L4 39μH
C26 22PF
R28 560
R29 3.3K
R33 6.8KB
AUDIO
COLOR(1)
VIDEO
COLOR(2)

NOTE: 1. UNLESS OTHERWISE SPECIFIED

1) TRANSISTOR

X1 ~ X3	2SC2647C
X5,6,8,9	2SD637R

2) DIODE

D3 ~ D5 MA150

3) RESISTORS VALUES ARE IN OHMS (1/8W CARBON RESISTOR)

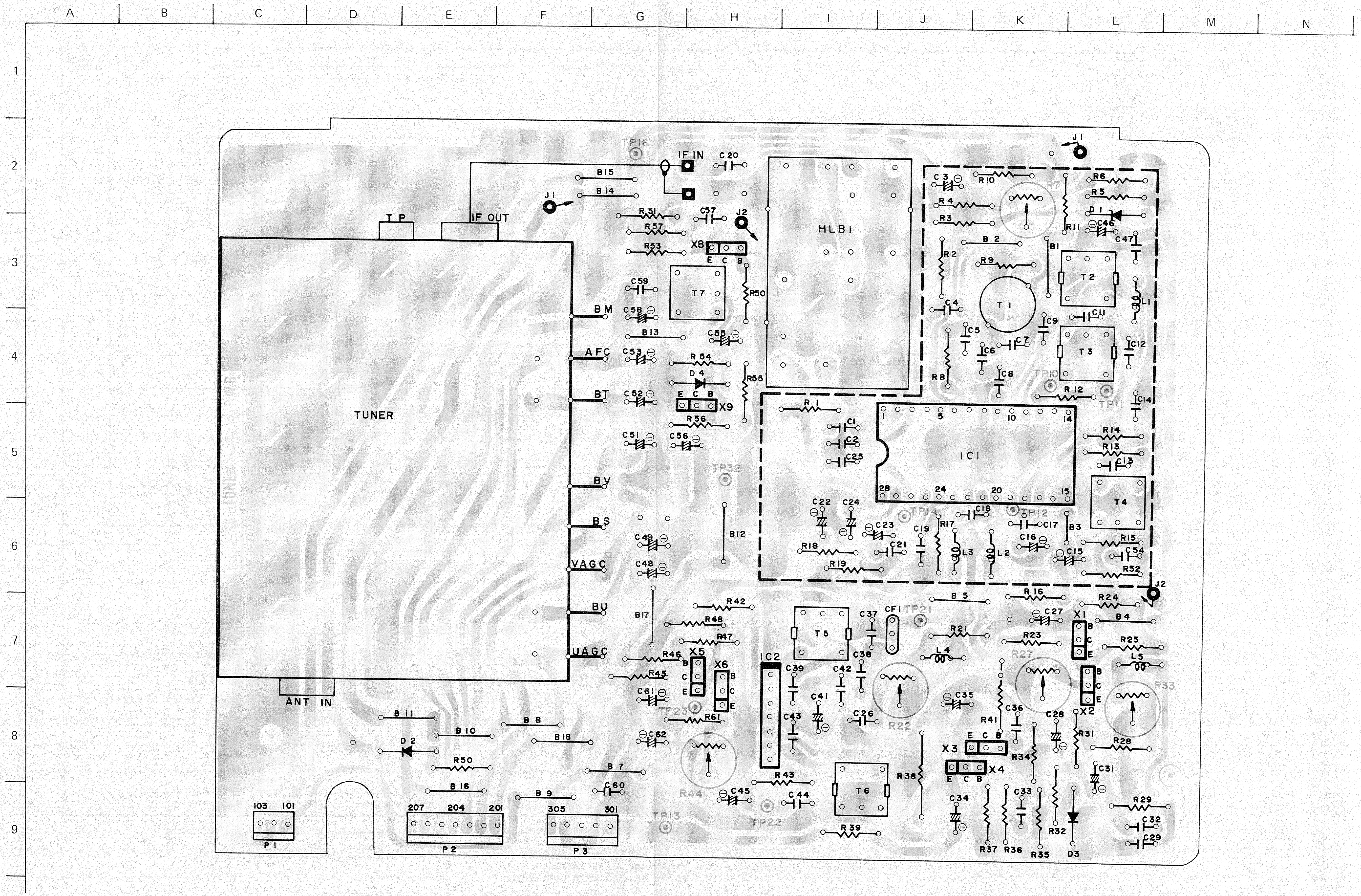
4) CAPACITORS VALUES ARE IN MICROFARADS.

- ELECTROLYTIC CAPACITOR
- CERAMIC CAPACITOR
- MYLAR CAPACITOR
- TANTALUM CAPACITOR

2. Voltages are DC measured with a digital voltmeter.

3. Shaded ( ) parts are critical for safety. Replace only with specifed part numbers.

5-16. TUNER & IF CIRCUIT BOARD-1 (EG)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C
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J
K
L
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TUNER
TP
IF OUT
ANT IN
BM
AFC
BT
BV
BS
VAGC
BU
UAGC
IF IN
J1
J2
TP16
TP32
TP10
TP11
TP14
TP12
TP21
TP23
TP22
TP13
HLB1
IC1
IC2
T1
T2
T3
T4
T5
T6
T7
X1
X2
X3
X4
X5
X6
X8
X9
E C B
D1
D2
D3
D4
L1
L2
L3
L4
L5
CF1
R1
R2
R3
R4
R5
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C62
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B11
B12
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B14
B15
B16
B17
B18
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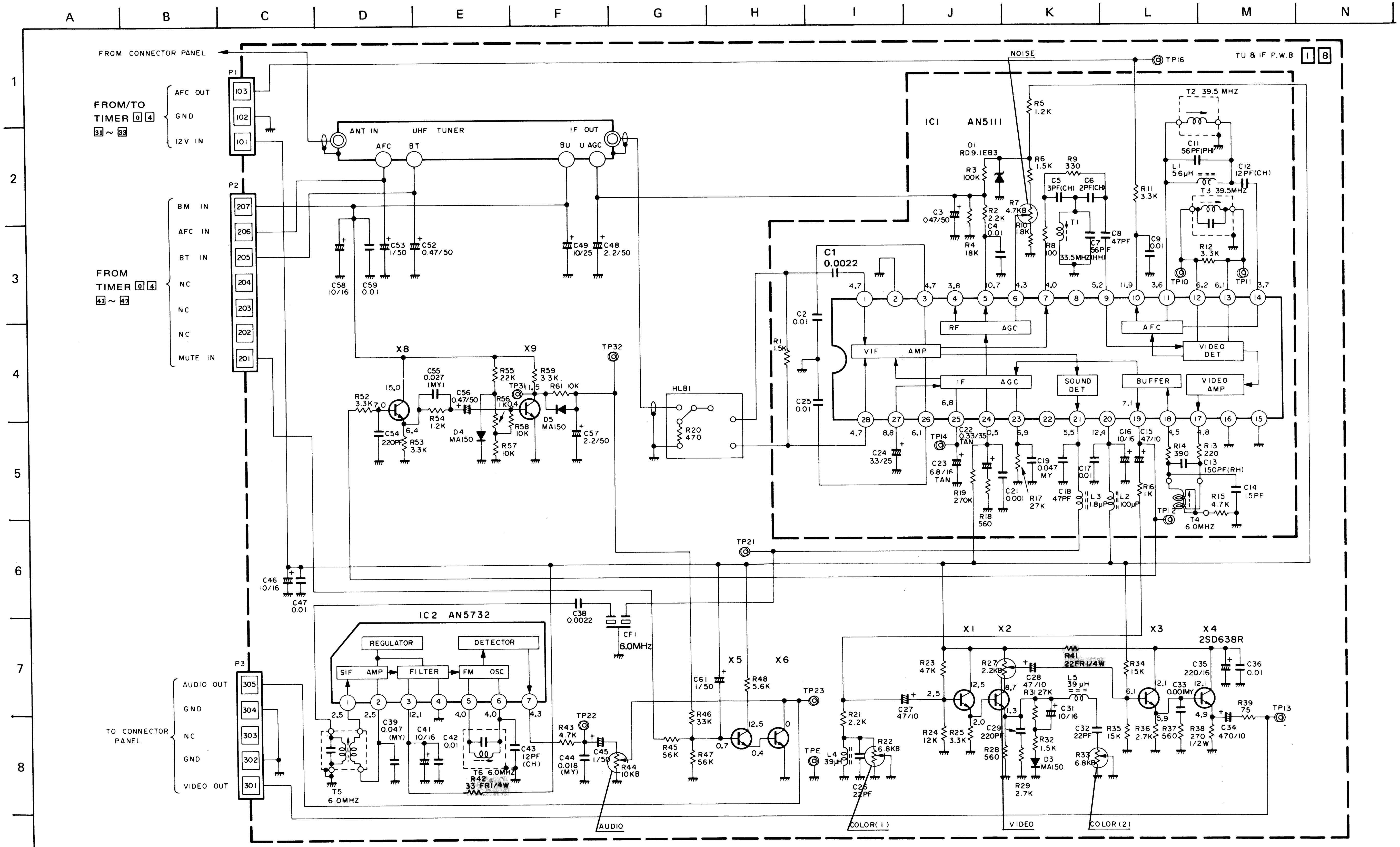
5
10
14
28
24
20
15
103
101
P1
207
204
201
P2
305
301
P3
PU21216 TUNER & IF PWB

5-17. TUNER & IF SCHEMATIC DIAGRAM-2 (EK)


A
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C
D
E
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G
H
I
J
K
L
M
N
1
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7
8
9
FROM CONNECTOR PANEL
FROM/TO TIMER 04 31 ~ 33
AFC OUT
GND
12V IN
P1
103
102
101
P2
BM IN
AFC IN
BT IN
NC
NC
NC
MUTE IN
207
206
205
204
203
202
201
FROM TIMER 04 41 ~ 47
ANT IN
UHF TUNER
IF OUT
AFC
BT
BU
U AGC
C58 10/16
C59 0.01
C53 1/50
C52 0.47/50
C49 10/25
C48 2.2/50
X8
X9
TP32
R52 3.3K
C55 0.027 (MY)
C56 0.47/50
R54 1.2K
C54 220PF
R53 3.3K
D4 MA150
R55 22K
R56 1K
R57 10K
R58 10K
R59 3.3K
TP31
R61 10K
D5 MA150
C57 2.2/50
HLB1
R20 470
NOISE
TP16
TU & IF P.W.B 1 8
IC1
AN5111
D1 RD9.1EB3
R3 100K
R5 1.2K
R6 1.5K
R9 330
R7 4.7KB
R10 1.8K
R2 2.2K
C3 0.47/50
C4 0.01
R4 18K
C5 3PF(CH)
C6 2PF(CH)
T1
R8 100
C7 56PF (HH)
33.5MHZ
C8 47PF
R11 3.3K
C9 0.01
T2 39.5 MHZ
C11 56PF(PH)
L1 5.6μH
C12 12PF(CH)
T3 39.5MHZ
R12 3.3K
TP10
TP11
C1 0.0022
C2 0.01
R1 1.5K
C25 0.01
RF AGC
VIF AMP
IF AGC
SOUND DET
BUFFER
VIDEO AMP
AFC
VIDEO DET
C22 0.33/35 TAN
TP14
C24 33/25
C23 6.8/16 TAN
R19 270K
R18 560
C21 0.001
R17 27K
C19 0.047 MY
C18 47PF
C17 0.01
L3 1.8μH
L2 100μH
C16 10/16
C15 47/10
R16 1K
R14 390
R13 220
C13 150PF(RH)
C14 15PF
R15 4.7K
TP12
T4 6.0MHZ
TP21
C46 10/16
C47 0.01
IC2 AN5732
REGULATOR
DETECTOR
SIF AMP
FILTER
FM OSC
C38 0.0022
CF1 6.0MHz
P3
AUDIO OUT
GND
NC
GND
VIDEO OUT
305
304
303
302
301
TO CONNECTOR PANEL
T5 6.0MHZ
C39 0.047 (MY)
C41 10/16
C42 0.01
T6 6.0MHZ
C43 12PF (CH)
R42 33 FR1/4W
TP22
R43 4.7K
C44 0.018 (MY)
C45 1/50
R44 10KB
AUDIO
X5
X6
C61 1/50
R48 5.6K
R46 33K
R45 56K
R47 56K
TP23
X1
X2
X3
X4 2SD638R
R23 47K
R27 2.2KB
R41 22FR1/4W
C28 47/10
R31 27K
L5 39 μH
C27 47/10
R21 2.2K
R22 6.8KB
R24 12K
R25 3.3K
C29 220PF
R28 560
R29 2.7K
R32 1.5K
D3 MA150
C31 10/16
C32 22PF
R33 6.8KB
R34 15K
R35 15K
R36 2.7K
R37 560
C33 0.001MY
R38 270 1/2W
C35 220/16
C36 0.01
R39 75
C34 470/10
TP13
TPE
L4 39μH
C26 22PF
COLOR(1)
VIDEO
COLOR(2)

NOTE: 1. UNLESS OTHERWISE SPECIFIED

1) TRANSISTOR

X1 ~ X3 2SC2647C

X5,6,8,9 2SD637R

2) DIODE

D3 ~ D5 MA 150

3) RESISTORS VALUES ARE IN OHMS.

(1/8W CARBON RESISTOR)

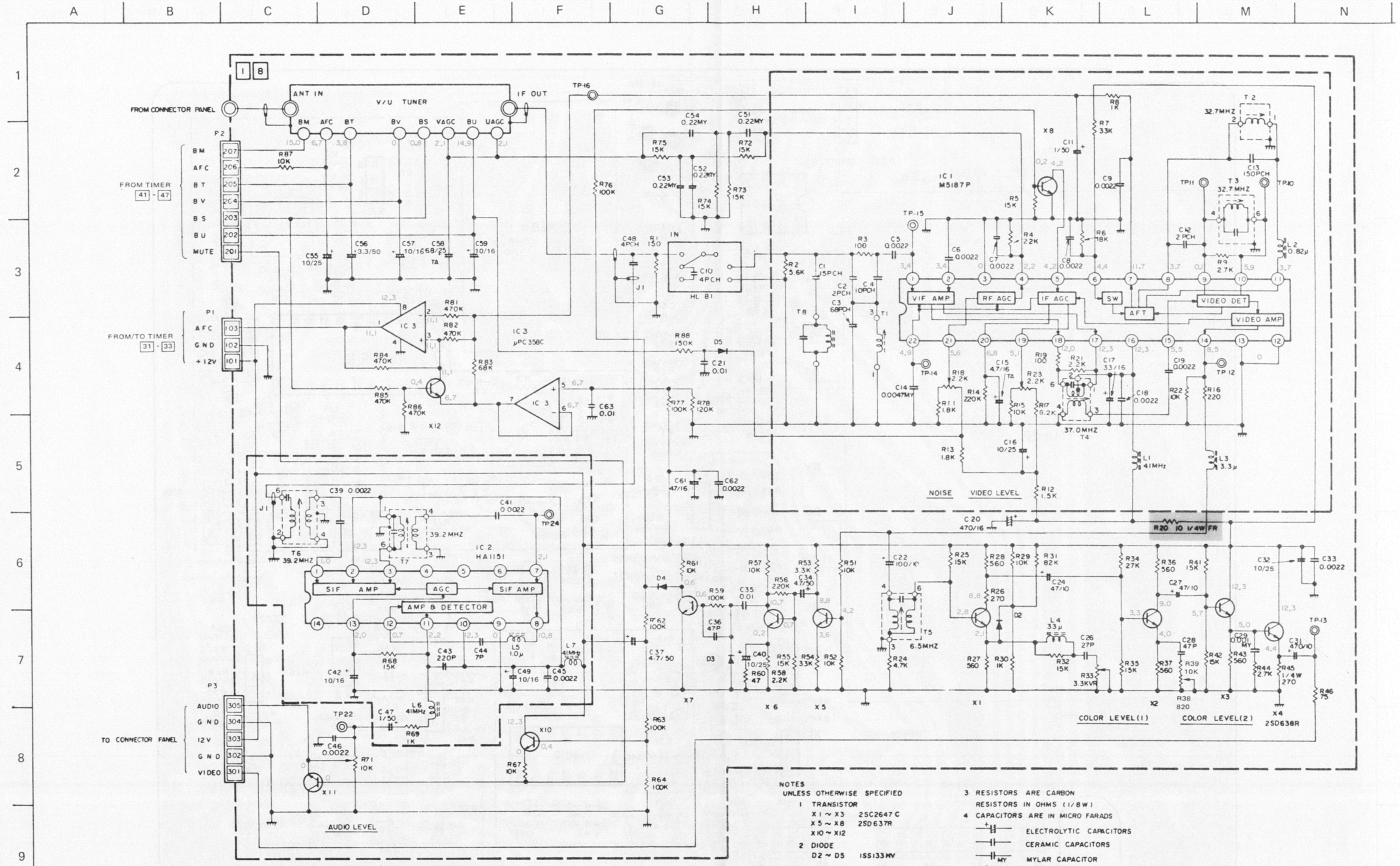
4) CAPACITORS VALUES ARE IN MICROFARADS

- ELECTROLYTIC CAPACITOR
- CERAMIC CAPACITOR
- MY MYLAR CAPACITOR
- TAN TANTALUM CAPACITOR

2. Voltages are DC measured with a digital voltmeter.

3. Shaded (▨) parts are critical for safety. Replace only with specifed part numbers.

5-19. TUNER & IF SCHEMATIC DIAGRAM-2 (S)



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J
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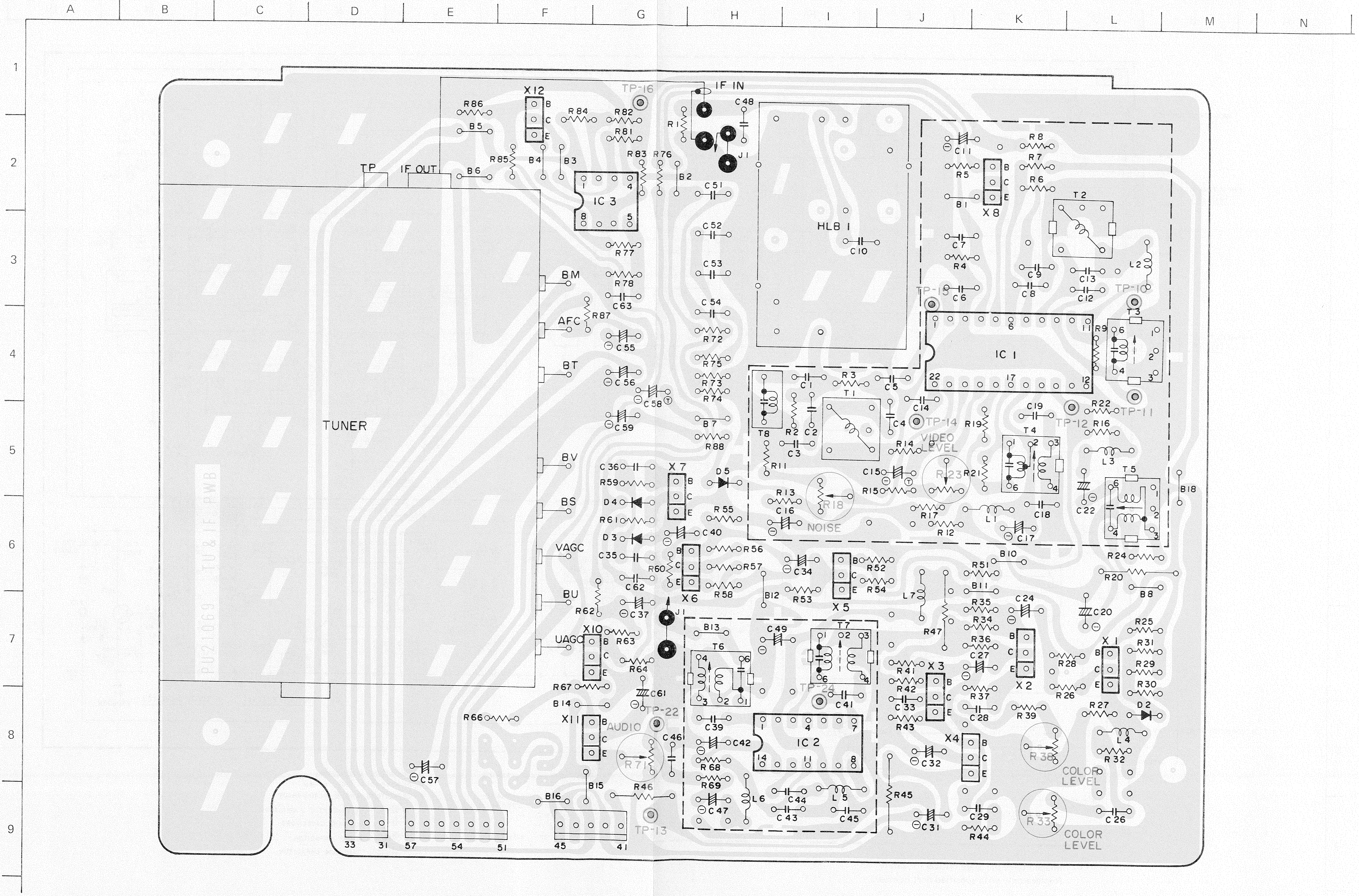
1 8
FROM CONNECTOR PANEL
ANT IN
V/U TUNER
IF OUT
BM
AFC
BT
BV
BS
VAGC
BU
UAGC
P2
FROM TIMER
41 - 47
207
206
205
204
203
202
201
MUTE
R87 10K
C55 10/25
C56 3.3/50
C57 10/16
C58 68/25 TA
C59 10/16
P1
FROM/TO TIMER
31 - 33
AFC
GND
+12V
103
102
101
IC 3
IC 3 μPC358C
R81 470K
R82 470K
R83 68K
R84 470K
R85 470K
R86 470K
X12
TP16
C54 0.22MY
C51 0.22MY
R75 15K
R72 15K
C53 0.22MY
C52 0.22MY
R74 15K
R73 15K
R76 100K
C48 4PCH
R1 150
J1
IN
C10 4PCH
HL 81
R88 150K
D5
C21 0.01
C63 0.01
R77 100K
R78 120K
C61 47/16
C62 0.0022
IC 1 M5187P
X8
C11 1/50
R8 1K
R7 33K
C9 0.0022
R5 15K
R4 2.2K
R6 18K
TP-15
R3 100
C5 0.0022
C6 0.0022
C7 0.0022
C8 0.0022
R2 5.6K
C1 15PCH
C2 2PCH
C4 10PCH
C3 68PCH
T8
T1
VIF AMP
RF AGC
IF AGC
SW
AFT
VIDEO DET
VIDEO AMP
T2 32.7MHZ
C13 150PCH
TP11
TP10
T3 32.7MHZ
C12 2PCH
R9 2.7K
L2 0.82μ
TP-14
C14 0.0047MY
R18 2.2K
R11 1.8K
R14 220K
C15 4.7/16 TA
R15 10K
R23 2.2K
R17 6.2K
R19 100
R21 2.2K
C17 33/16
C18 0.0022
37.0MHZ T4
C19 0.0022
R22 10K
R16 220
TP 12
C16 10/25
R13 1.8K
NOISE
VIDEO LEVEL
R12 1.5K
L1 41MHz
L3 3.3μ
C20 470/16
R20 10 1/4W FR
J1
C39 0.0022
T6 39.2MHZ
T7
39.2MHZ
C41 0.0022
TP24
IC 2 HA1151
SIF AMP
AGC
SIF AMP
AMP & DETECTOR
R68 15K
C43 220P
C44 7P
L5 1.0μ
C42 10/16
C49 10/16
C45 0.0022
L7 41MHz
C47 1/50
L6 41MHz
R69 1K
TP22
C46 0.0022
R71 10K
X11
AUDIO LEVEL
P3
TO CONNECTOR PANEL
AUDIO
GND
12V
GND
VIDEO
305
304
303
302
301
X10
R67 10K
R61 10K
D4
R62 100K
C37 4.7/50
R63 100K
R64 100K
D3
X7
R59 100K
C35 0.01
C36 47P
C40 10/25
R60 47
R57 10K
R56 220K
R53 3.3K
C34 4.7/50
R55 15K
R58 2.2K
R54 3.3K
R52 10K
R51 10K
X6
X5
C22 100/10
T5 6.5MHZ
R24 4.7K
R25 15K
R28 560
R29 10K
R31 82K
C24 47/10
R26 270
D2
R27 560
R30 1K
L4 33μ
C26 27P
R32 15K
R33 3.3KVR
X1
COLOR LEVEL(1)
R34 27K
R35 15K
R36 560
R41 15K
C27 47/10
C28 47P
R37 560
R39 10K
R38 820
X2
R42 15K
R43 560
C29 0.01μ MY
X3
COLOR LEVEL(2)
C32 10/25
C33 0.0022
R44 2.7K
R45 1/4W 270
X4 2SD638R
C31 470/10
TP-13
R46 75

NOTES
UNLESS OTHERWISE SPECIFIED
1 TRANSISTOR
X1 ~ X3 2SC2647C
X5 ~ X8 2SD637R
X10 ~ X12
2 DIODE
D2 ~ D5 1SS133MV

3 RESISTORS ARE CARBON
RESISTORS IN OHMS (1/8W)
4 CAPACITORS ARE IN MICRO FARADS
ELECTROLYTIC CAPACITORS
CERAMIC CAPACITORS
MY MYLAR CAPACITOR
TAN TANTALUM CAPACITOR

NOTE: Shaded (▨) parts are critical for safety.
Replace only with specified part numbers.

5-20. TUNER & IF CIRCUIT BOARD-2 (S)



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TUNER
PU21069 TU & IF PWB
TP
IF OUT
IF IN
TP-16
X12
R86
B5
R84
R82
R81
R85
B4
B3
B6
R83
R76
R1
C48
J1
B2
IC 3
C51
C52
C53
C54
R77
R78
C63
R87
BM
AFC
BT
BV
BS
VAGC
BU
UAGC
C55
C56
C58
C59
R72
R75
R73
R74
B7
R88
HLB 1
C10
C11
R8
R7
R6
R5
B1
X8
T2
C7
R4
C9
C8
C13
C12
L2
C6
TP-15
TP-10
T3
IC 1
R9
C1
R3
T1
C5
C14
C4
T8
R2
C2
C3
R11
TP-14
VIDEO LEVEL
R14
R19
C19
TP-12
R22
TP-11
R16
T4
L3
C15
R15
R23
R21
R13
R18
C16
NOISE
R17
R12
L1
C18
C17
T5
C22
B18
C36
R59
D4
R61
D3
C35
C62
X7
D5
R55
C40
R56
R60
R57
X6
R58
B12
C34
R53
X5
R52
R54
B10
R51
B11
L7
R35
R34
R36
R24
R20
B8
C24
C20
C37
R62
X10
R63
R64
B13
C49
T6
T7
R47
R25
R31
R29
R30
X1
R41
R42
X3
C27
R28
X2
R26
R67
C61
B14
TP-24
C41
C33
R43
R37
C28
R39
R27
D2
R66
X11
TP-22
AUDIO
C39
C42
IC 2
C46
R71
R68
R69
C47
L6
C44
C43
L5
C45
X4
C32
R45
R38
COLOR LEVEL
L4
R32
C57
B16
B15
R46
TP-13
C31
C29
R44
R33
C26
33
31
57
54
51
45
41

SECTION 6

ELECTRICAL PARTS LIST

TABLE OF CONTENTS

6-1. REGULATOR P.C BOARD BLOCK 6-2
6-2. PRESETTER P.C BOARD BLOCK 6-2
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6-4. FUNCTION & DISPLAY P.C BOARD BLOCK 6-2
6-5. TUNER & IF P.C BOARD BLOCK (EG/EK) 6-3
6-6. TUNER & IF P.C BOARD BLOCK (S) 6-3
6-7. UNFLAMMABLE P.C BOARD BLOCK 6-3

6-1. REGULATOR P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
1-1	BA707131	PC REGULATOR BLK VU-77
1-IC1	EI328798	IC μPC78M05H
1-X1,2	ET741589	TR 2SD639S
1-X3	ET702379	TR 2SD637R
1-X4	ET707089	TR 2SD1128-04
1-D1,2	ED311849	D SILICON SS-3A 400/3.5A
1-D3	ED703138	D SILICON 10E2
1-D4	ED330219	D ZENER H HZ20L 2
1-D5	ED329056	D ZENER H HZ22 2
1-D6	ED703138	D SILICON 10E2
1-D7	ED707088	D SILICON MA171
1-D8	ED305442	D ZENER H RD6.8E B
1-D9	ED707088	D SILICON MA171
1-D11	ED707158	D SILICON 10E1S
1-D12,13	ED740729	D SILICON MA150
1-D14,15	ED703138	D SILICON 10E2
1-D16,17	ED707088	D SILICON MA171
1-D18	ED707090	D SILICON MA161
1-D19,20	ED703138	D SILICON 10E2
1-RY1	EP709793	RELAY
1-R5,6	ER707091	R OMF H 1/2W R22J
1-R9	EV741005	R S-FIX 102
1-R13	EV741002	R S-FIX 222
1-R18	ER705253	⚠ R FUSE 2R0
1-R22	ED707092	POSISTOR

6-2. PRESETTER P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
2-1	BA707132	PC PRESETTER BLK VU-77EG
2-1	BA707142	PC PRESETTER BLK VU-77EK
2-1	BA707145	PC PRESETTER BLK VU-77S
2-IC1	EI707093	IC TL496CP
2-X1to14	ET702379	TR 2SD637R
2-D1to12	ED707103	D SILICON MA162
2-D13to24	ED707103	D SILICON MA162 (EG,S)
2-D25	ED317690	D ZENER H RD7.5E B1
2-D26	ED740729	D SILICON MA150
2-D27	ED707094	D ZENER HZ3A2C
2-D28	ED703138	D SILICON 10E2
2-D29	ED707096	D SILICON 11DQ04
2-D30	ED317690	D ZENER H RD7.5E B1
2-D31	ED703138	D SILICON 10E2
2-T1	EO707097	COIL
2-R48	EV741001	R S-FIX 472
2-2	BV707098	TUNING BLK (EG)
2-2	BV707138	TUNING BLK (EK)
2-2	BV707151	TUNING BLK (S)
2-3	ES707099	SW SLIDE (FOR AFC)

6-3. TIMER P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
3-1	BA707146	PC TIMER BLK VU-77EG/S
3-1	BA707143	PC TIMER BLK VU-77EK
3-IC1	EI705215	IC SM5502A
3-IC2	EI707100	IC μPD553C-100
3-IC3	EI705241	IC μPC574J-KL
3-X101to104	ET702379	TR 2SD637R
3-X105	ET707101	TR 2SB644R
3-X106	ET702379	TR 2SD637R
3-X107	ET702379	TR 2SD637R (EG, S)
3-X108,109	ET707101	TR 2SB644R (EG, S)
3-X110,111	ET702379	TR 2SD637R
3-X112	ET707102	TR 2SD389A,O
3-X113	ET707101	TR 2SB644R
3-D101,102	ED740729	D SILICON MA150
3-D104,105	ED740729	D SILICON MA150
3-D106,107	ED707103	D SILICON MA162
3-D108	ED707103	D SILICON MA162 (EG, S)
3-D109,110	ED707103	D SILICON MA162
3-D111	ED707104	D ZENER RD27EB2
3-D112	ED740729	D SILICON MA150
3-X'TAL	EI705259	OSC X'TAL
3-CF101	ER705375	FILTER CE CSB-400P
3-RA101,102	ED707107	POSISTOR
3-R134	ER301697	R OMF H FS 1W 561J
3-R135	ER707105	R FS 5W 331J
3-R139	ED707107	POSISTOR
3-C104	EC707109	C S-FIX

6-4. FUNCTION & DISPLAY P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
4-1	BA707134	PC FUNCTION & DISPLAY BLK VU-77EG/EK
4-1	BA707147	PC FUNCTION & DISPLAY BLK VU-77S
4-2	EM707123	FLD (EG, EK)
4-2	EM707153	FLD (S)
4-IC1	EI707110	IC μPD552C-068
4-X1to4	ET702379	TR 2SD637R
4-X5	ET741586	TR 2SB643R
4-X6,7	ET702379	TR 2SD637R
4-X8	ET707111	TR 2SD1211R
4-X9	ET702379	TR 2SD637R
4-D1to12	ED707112	D LED SLR54MT4
4-D13to24	ED707103	D SILICON MA162
4-D25to27	ED310584	D LED GL-9PR2 RED
4-D28	ED707113	D LED
4-D29	ED740729	D SILICON MA150
4-D30	ED707114	D ZENER RD6.8EB2
4-D31to37	ED740729	D SILICON MA150
4-S1to12	ES709708	SW PUSH
4-S13	ES707120	SW PUSH (EG, EK)
4-S13	ES707188	SW PUSH (S)
4-S18	ES707121	SW PUSH
4-S19to23	ES709708	SW PUSH
4-S24	ES707122	SW LEVER
4-L1	EO705209	COIL CHOKE
4-CF1	ER705375	FILTER CE CSB-400P
4-RA1	ER707115	COMP R
4-RA2,3	ER707116	COMP R
4-RA4,5	ER707118	COMP R
4-RA6	ER707119	COMP R

6-5. TUNER & IF P.C BOARD BLOCK (EG/EK)

REF. NO.	PARTS NO.	DESCRIPTION
5-1	BA707135	PC TUNER & IF BLK VU-77EG
5-1	BA707149	PC TUNER & IF BLK VU-77EK
5-2	EE707129	TUNER
5-IC1	EI705287	IC AN5111
5-IC2	EI705288	IC AN5732
5-X1to3	ET705198	TR 2SC2647C
5-X4	ET704431	TR 2SD638R
5-X5to9	ET702379	TR 2SD637R
5-D1	ED322410	D ZENER RD9.1E B3
5-D3,4	ED740729	D SILICON MA150
5-D5	ED740729	D SILICON MA150 (EK)
5-HLB1	ER705304	FILTER HLB
5-FLB1	ER707157	FILTER HLB
5-CF1	ER705307	FILTER CE (EG)
5-CF1	ER705308	FILTER CE (EK)
5-T1	EO705296	COIL (EG)
5-T1	EO705457	COIL (EK)
5-T2	EO705286	COIL
5-T3	EO705297	COIL
5-T4	EO705298	COIL (EG)
5-T4	EO705299	COIL (EK)
5-T5	EO705300	COIL (EG)
5-T5	EO705301	COIL (EK)
5-T6	EO705302	COIL (EG)
5-T6	EO705303	COIL (EK)
5-T7	EO707126	COIL (EG)
5-L1	EO741021	COIL PEAKING
5-L2	EO741015	COIL PEAKING
5-L3	EO741506	COIL PEAKING
5-L4,5	EO741030	COIL PEAKING
5-R7	EV741001	R S-FIX 472
5-R22	EV741529	R S-FIX 682
5-R27	EV741002	R S-FIX 222
5-R33	EV741529	R S-FIX 682
5-R41	ER705277	⚠ R FUSE 220
5-R42	ER704380	⚠ R FUSE 330
5-R44	EV740999	R S-FIX 103
5-C22	EC305422	C TT V D R33K 35DC
5-C23	EC632507	C TT V DTS 6R8M 16DC

6-6. TUNER & IF P.C BOARD BLOCK (S)

REF. NO.	PARTS NO.	DESCRIPTION
6-1	BA707148	PC TUNER & IF BLK VU-77S
6-2	EE707156	TUNER
6-IC1	EI705384	IC M5187P
6-IC2	EI741386	IC HA1151
6-IC3	EI311392	IC μPC358C
6-X1to3	ET705198	TR 2SC2647C
6-X4to8	ET704431	TR 2SD638R
6-X10to12	ET702379	TR 2SD637R
6-D2to5	ED332270	D SILICON H 1SS133
6-HLB1	ER705401	FILTER HLB
6-T1	EO705392	COIL
6-T2	EO707154	COIL
6-T3	EO705394	COIL
6-T4	EO705395	COIL
6-T5	EO705397	COIL
6-T6	EO705398	COIL
6-T7	EO705399	COIL
6-T8	EO707155	COIL
6-L1	EO705389	COIL PEAKING
6-L2	EO705390	COIL PEAKING
6-L3	EO705391	COIL PEAKING
6-L4	EO741018	COIL PEAKING
6-L5	EO741427	COIL PEAKING
6-L6	EO705389	COIL PEAKING
6-L7	EO705389	COIL PEAKING
6-R18	EV741002	R S-FIX 222
6-R20	ER709690	R FUSE 100
6-R23	EV741002	R S-FIX 222
6-R33	EV703157	R S-FIX 332
6-R38	EV740999	R S-FIX 103
6-R71	EV740999	R S-FIX 103
6-C15	EC306201	C TT V DTS 4R7M 25DC
6-C58	EC632507	C TT V DTS 6R8M 16DC

6-7. UNFLAMMABLE P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
7-R101	ER709810	R CB FS 3R3
7-R102	ER707189	R CB 2R2K
7-R103	ED707124	POSISTOR
7-R104	ER707125	R FS 5W 561J

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ED317690	2-D30
ED322410	5-D1
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ED330219	1-D4
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AKAI
AC POWER ADAPTER
AKAI
CAUTION:

AC POWER ADAPTER

MODEL VA-77EG/EK/S

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SECTION 1 GENERAL DESCRIPTION

This manual provides service information for the AKAI AC Power Adapter Model VA-77EG/EK/S.

Due to design modifications, the servicing procedures and data given in this manual are subject to possible change without prior notice.

Thank you for purchasing the AKAI VA-77EG/EK AC Power Adapter. This unit provides DC power for the AKAI VP-77EG/EK Portable Video Cassette Recorder from a household AC outlet. It can also be used to recharge the BP-N77 Battery Pack, which is for exclusive use with the VP-77EG/EK.

Before using the VA-77EG/EK, read this instruction booklet carefully for obtaining the best results.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

NOTE: The rating plate is on the rear of this unit.

IMPORTANT (In the United Kingdom)
Mains Supply (AC 240V ~, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with following code:

Blue to N (Neutral) or Black
Brown to L (Live) or Red

If these colours do not correspond with the terminal identifications of your plug, connect as follows:

Blue wire to terminal coded N (Neutral) or coloured Black.

Brown wire to terminal coded L (Live) or coloured Red.

If in doubt – consult a competent electrician.

NOTE: This equipment should be disconnected from the mains when not in use.

CAUTION

To prevent electric shock, do not open the cabinet. No user serviceable parts inside. Refer servicing to qualified service personnel.

POWER SYSTEM

Connection to the mains supply

The operating voltage of this set is preset to 220V ~ (EK-version: 240V ~) at the factory.

Before connecting to mains, check that the voltage selector on the rear panel is set to the same voltage as your local mains supply.

Adapting to local power line

This set operates on either 110, 127, 220 or 240V ~.

If the preset voltage is different from the power line voltage in your area, reset the voltage selector by inserting a screwdriver into the slot of the voltage selector and turning it until the correct voltage is displayed.

1-1. FEATURES

- Powers the AKAI VP-77EG/EK portable video cassette recorder from an AC household outlet.
- Recharges the BP-N77 battery pack (optional).
- Can recharge two BP-N77 battery packs in series; first the one installed in the recorder and then, automatically, the other installed in this adapter.
- Powers the moisture condensation preventive circuit built into the VP-77EG/EK portable video cassette recorder.

1-2. PRECAUTIONS

- The VA-77EG/EK is used exclusively with the AKAI VP-77EG/EK portable video cassette recorder and cannot be employed for other video recorders.
- Be careful not to block the ventilation openings, as heat is generated inside the unit.
- Do not allow inflammables, water or metallic objects to enter the unit, as this will cause damage or malfunctioning.
- Do not insert any object other than the AKAI BP-N77 battery pack into the battery compartment, as this will cause damage or malfunctioning.
- Never remodel the unit or use it when its cabinet is removed.
- Do not damage or alter the power cord as it may cause electric shocks or short circuits.
- Avoid violent shocks and rough handling of the unit.
- When turning the power supply of the unit off, first set the video cassette recorder to the Stop mode.
- Do not allow any foreign objects into the battery compartment of the unit.
- Avoid using the unit under the following conditions:
  - Direct sunlight or places of extremely high temperature, such as near a heater.
  - Places subject to high humidity.
  - Places subject to vibrations.

If malfunctioning occurs, stop using the unit immediately, unplug the power cord and consult your local AKAI dealer.

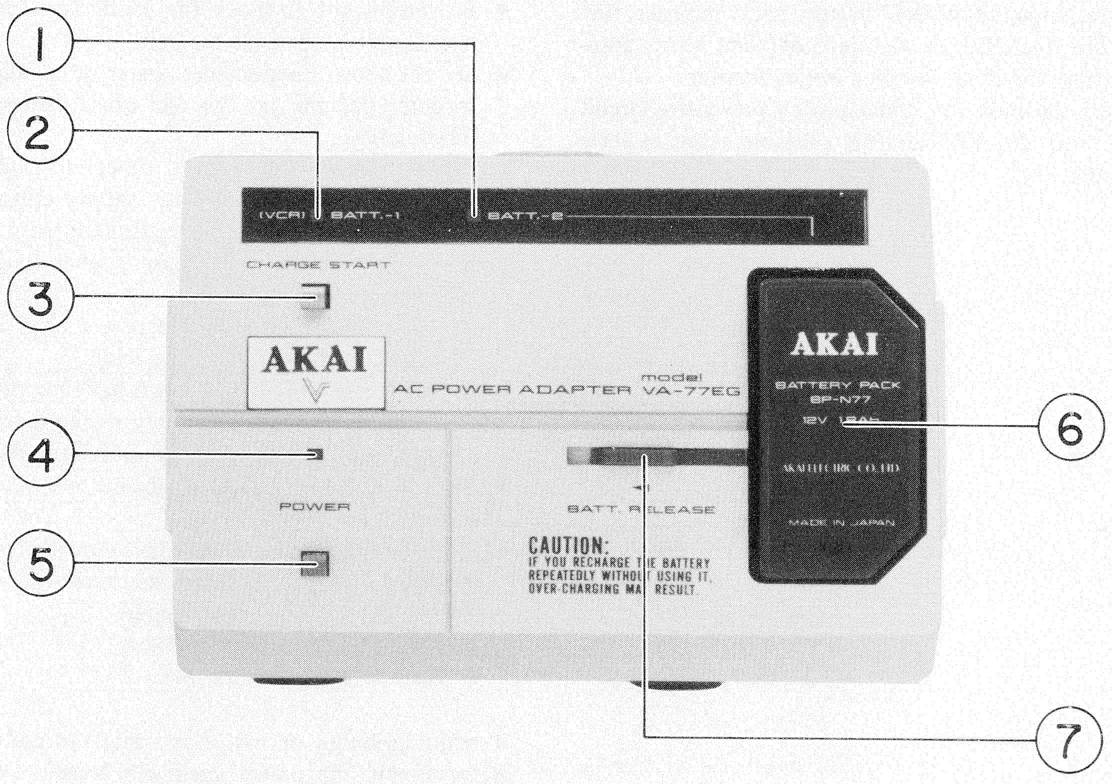
1-3. SPECIFICATIONS

POWER REQUIREMENT	110/127/220/240V ~, 50/60 Hz
POWER CONSUMPTION	70 watts
RATED OUTPUT VOLTAGE	12V ⎓ DC
RATED OUTPUT CURRENT	1.8A
DIMENSIONS	15.0(W) x 10.3(H) x 30.4(D) cm
WEIGHT	3.6 kg
PROVIDED ACCESSORY	POWER CORD

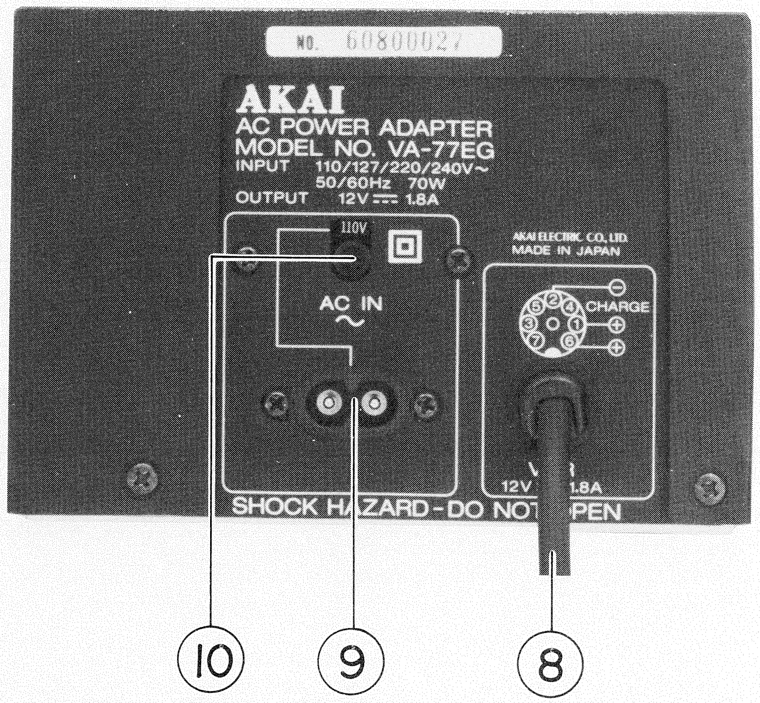
Design and specifications subject to change without notice.

1-4. CONTROLS AND CONNECTORS

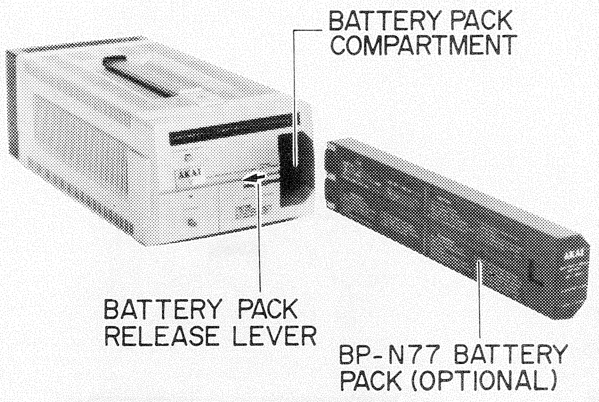
Front Panel


1
2
(VCR) BATT.-1
BATT.-2
CHARGE START
3
AKAI
AC POWER ADAPTER
model VA-77EG
AKAI
BATTERY PACK
BP-N77
12V 1.8Ah
AKAI ELECTRIC CO., LTD.
MADE IN JAPAN
6
4
POWER
BATT. RELEASE
CAUTION:
IF YOU RECHARGE THE BATTERY REPEATEDLY WITHOUT USING IT, OVER-CHARGING MAY RESULT.
5
7

Rear Panel


NO. 60800027
AKAI
AC POWER ADAPTER
MODEL NO. VA-77EG
INPUT 110/127/220/240V~
50/60Hz 70W
OUTPUT 12V ⎓ 1.8A
110V
AC IN
~
AKAI ELECTRIC CO., LTD.
MADE IN JAPAN
CHARGE
12V 1.8A
SHOCK HAZARD-DO NOT OPEN
10
9
8

1. **BATT-2 indicator**
   Remains lighted while recharging the BP-N77 battery pack inserted in the compartment of the VA-77EG/EK.
   Upon completion of recharging, it goes out.
2. **BATT-1 indicator**
   Remains lighted while recharging the BP-N77 battery pack inserted in the VP-77EG/EK portable video cassette recorder.
   Upon completion of recharging, it goes out.
3. **CHARGE START button**
   Press to start recharging the battery pack.
4. **Power indicator**
   Lights when the power is ON and goes out when the power is OFF.
5. **POWER button**
   Press to turn the power ON (▬).
   Press again (■) to turn power OFF.
6. **Battery pack compartment**
   Insert a battery pack for recharging.
7. **Battery pack RELEASE lever**
   Slide to the left to remove the battery pack.
8. **DC output cord**
   Connect to the TUNER/AC ADAPTER connector of the recorder.
9. **AC input connector (AC ~ IN)**
10. **Voltage selector**
    Set to the power supply voltage in your area. (See "POWER SYSTEM" on page VA-2.)



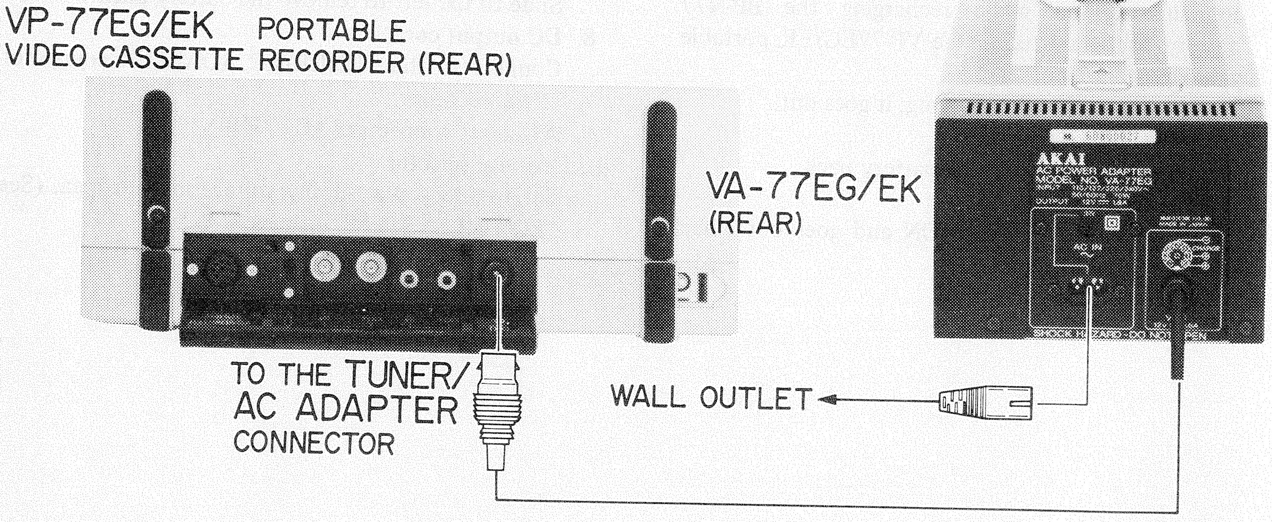
Inserting and removing of the BP-N77 battery pack

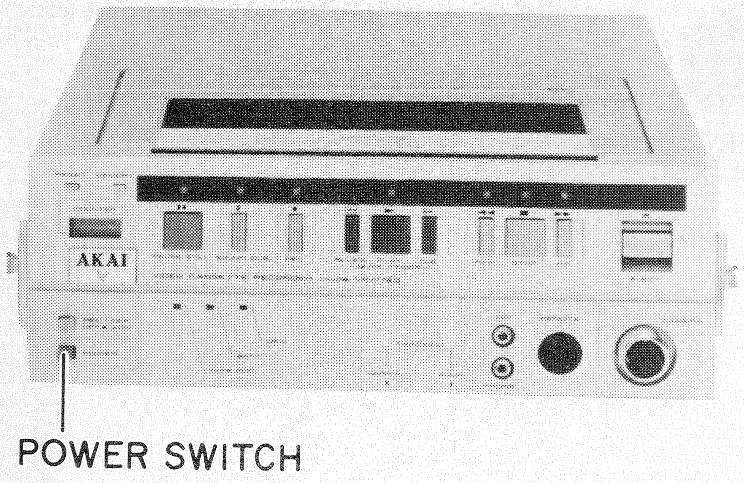
- Remove the cover of the compartment.
- Insert the BP-N77 battery pack into the compartment completely, making sure it locks in place.

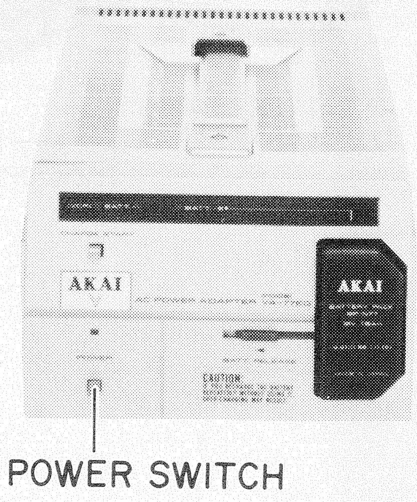
Removing

- Slide the battery pack RELEASE lever to the left.

1-5. CONNECTIONS

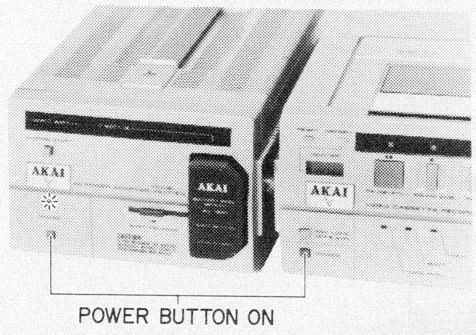

VP-77EG/EK PORTABLE
VIDEO CASSETTE RECORDER (REAR)
VA-77EG/EK
(REAR)
TO THE TUNER/
AC ADAPTER
CONNECTOR
WALL OUTLET
AKAI
AC POWER ADAPTER
MODEL NO. VA-77EG
SHOCK HAZARD-DO NOT OPEN


AKAI
POWER SWITCH

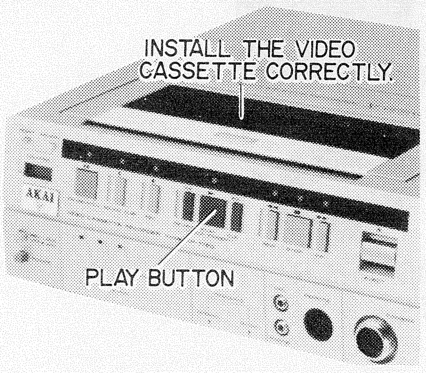

AKAI
AC POWER ADAPTER
CAUTION
POWER SWITCH

NOTE: Before connecting, set the power switches of both the VA-77EG/EK and the VP-77EG/EK to OFF.

1-6. PROVIDING POWER FOR THE VP-77EG/EK PORTABLE VIDEO CASSETTE RECORDER

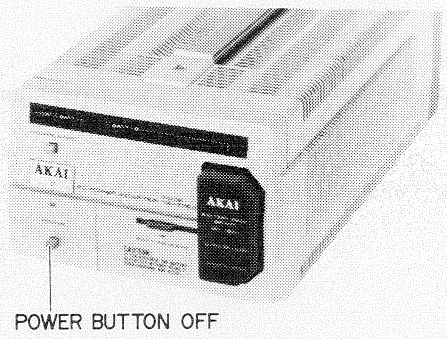


- Connect correctly following the illustration on the previous page.
- Set the POWER buttons of both the VA-77EG/EK and the VP-77EG/EK to the ON position.
  (The power indicator of the VA-77EG/EK will light up.) Preparation is now completed.



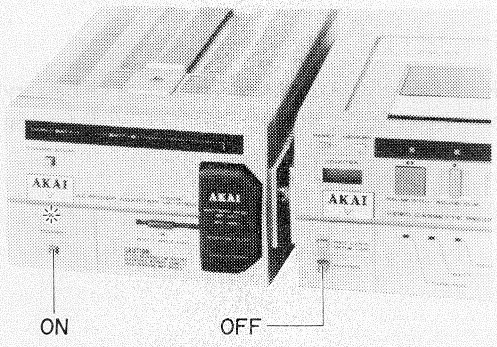
When playing back pre-recorded video tapes

Insert the video cassette into the VP-77EG/EK and press the PLAY button.



When the VP-77EG/EK is not in use

- Set the POWER button to OFF.



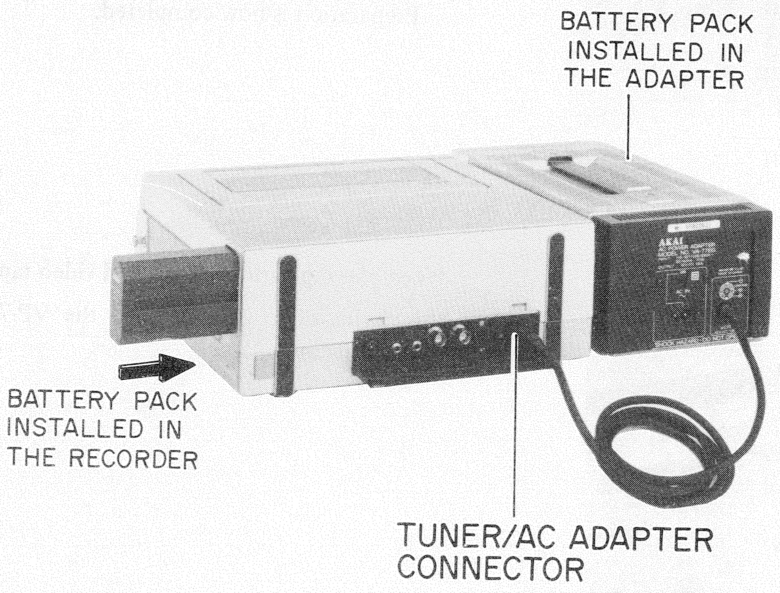
To prevent moisture condensation

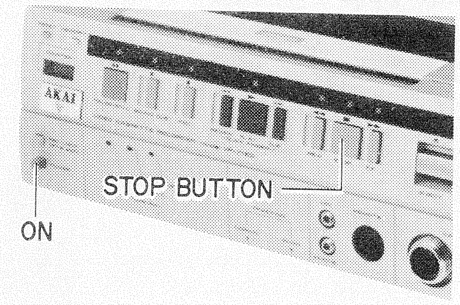
If the POWER button of this unit is set to ON with the POWER button of the VP-77EG/EK set to OFF, the moisture condensation prevention heater inside the VP-77EG/EK is powered. However, if for some reason you are not using the VP-77EG/EK for a long period of time, it is advisable to remove the power cord of the VA-77EG/EK from the AC outlet.

1-7. RECHARGING THE BP-N77 BATTERY PACK

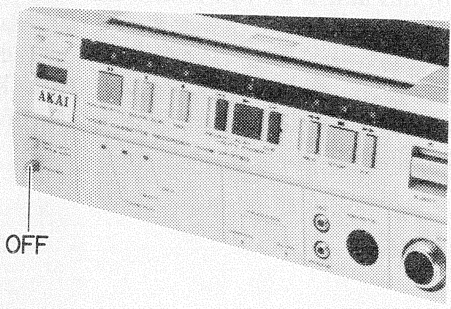
The VA-77EG/EK can recharge two battery packs in series. First the battery pack installed in the video recorder is recharged and then, automatically, the battery pack installed in the adapter itself is recharged.

- **Connection**

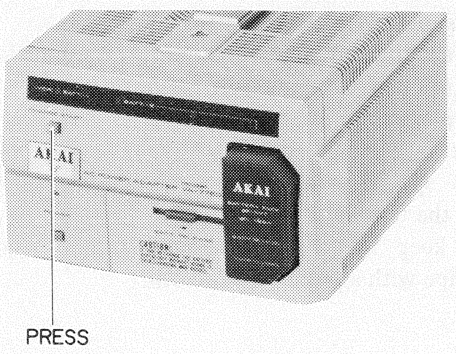

BATTERY PACK INSTALLED IN THE ADAPTER
BATTERY PACK INSTALLED IN THE RECORDER
TUNER/AC ADAPTER CONNECTOR


STOP BUTTON
ON

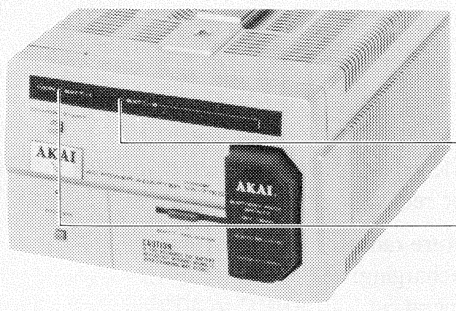
1. Insert the battery packs correctly into both the recorder and the adapter.
2. Press the POWER buttons of the VA-77EG/EK and the recorder to ON (▬) and set the recorder to the Stop mode.



3. Press the POWER button of the recorder to OFF. (The battery pack cannot be recharged unless the recorder's POWER button is set to OFF).



4. Press the CHARGE START button of the adapter. (Recharging the battery packs, both in the VP-77EG/EK and the VA-77EG/EK, is now possible.)
   - If you have already begun recharging one battery pack and later install another battery pack, in either the VP-77EG/EK or the VA-77EG/EK, continuous recharging for the later installed battery pack will not be performed. When the first battery pack has been recharged, it is necessary to press the CHARGE START button once again for recharging of the second battery pack to begin.



5. During recharging, the charging indicators for the respective battery packs light up. Upon completion of recharging, the indicators will go out.

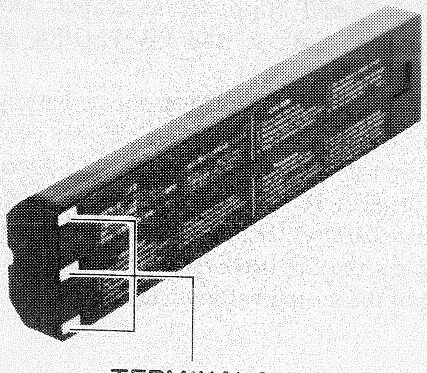
Indicates the charging condition of the battery pack inside the VA-77EG/EK.

Indicates the charging condition of the battery pack inside the VP-77EG/EK.

1-8. CAUTIONS REGARDING THE BATTERY PACK AND RECHARGING

The BP-N77 is a nickel-cadmium (Ni-Cd) battery. Give attention to the following to make the most of its characteristics.

- Before use, fully recharge the battery pack.
- Even when you are not using the battery pack, it will gradually discharge of itself. This natural discharging is accelerated as the ambient temperature rises.
  Therefore, it is recommended that you store the battery pack at a place of low temperatures.
- Do not discard the battery pack into fire nor leave it continuously exposed to high temperatures.
- The battery may not be 100% rechargeable immediately after its natural discharge, since it has been inactivated. Repeat the recharge/discharge procedures two to three times in such a case, so as to restore the full efficiency of the battery.
- The battery pack has its own service life. If its operating time becomes exceedingly short even though you recharge it correctly, it means that the battery pack is nearing the end of its service life. Replace with a fresh one in such cases.
- Do not disassemble or remodel the battery pack.



- **Do not short-circuit the terminals**
  If they are shorted, a great amount of current flows. This is not only very dangerous, but also makes the battery pack unusable.
- When transporting or storing the battery pack, exercise special care so that no metallic object touches the terminals.
- Always keep the terminals clean. If they become dirty, wipe with a piece of soft cloth.

- The average recharging time takes about 90 minutes per battery pack.
  When recharging a battery pack inside the VP-EG/EK and one inside the VA-77EG/EK at the same time, the recharging time takes about 180 minutes. (The recharging time is based on room temperature of 20°C with a power supply of 220V (EG/S-version) or 240V (EK-version). The lower the temperature, the longer the recharging time.)

Temperature ranges:

For recharging:	10°C to 35°C
For operating:	−10°C to 40°C
For storing:	−10°C to 30°C

SECTION 2 DISASSEMBLY

2-1. CHASSIS REMOVAL

1. Take out the two screws ① and two screws ② as shown in Fig. 2-1, then slide the top cover rearward to remove.

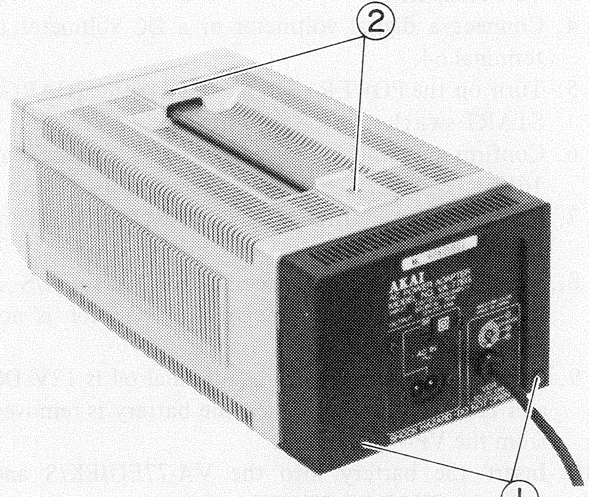


Fig. 2-1

2. Take out the four screws ③ of the four feet and one screw ④ with a plain washer, then remove the bottom cover.

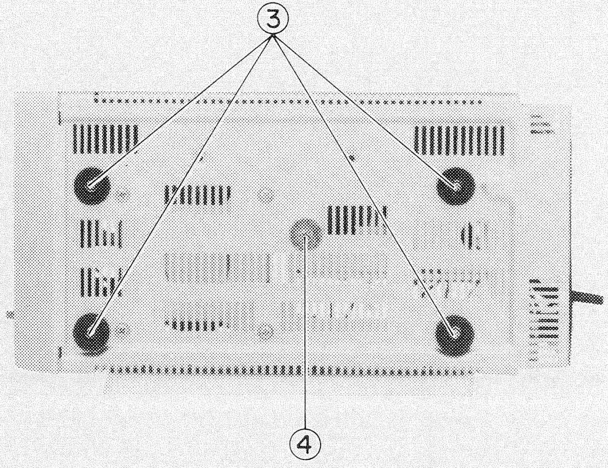


Fig. 2-2

3. Loosen two screws ⑤ located at the lower left and right portions of the front cover. Disengage two hooks ⑥ and remove the front cover.

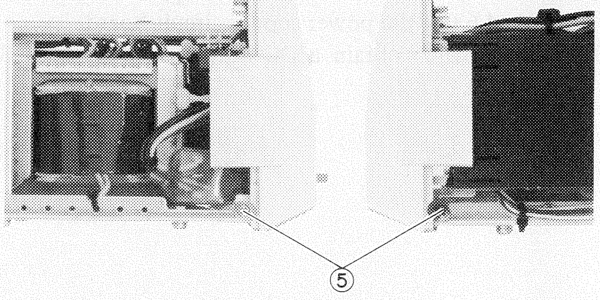


Fig. 2-3 (a) Fig. 2-3 (b)

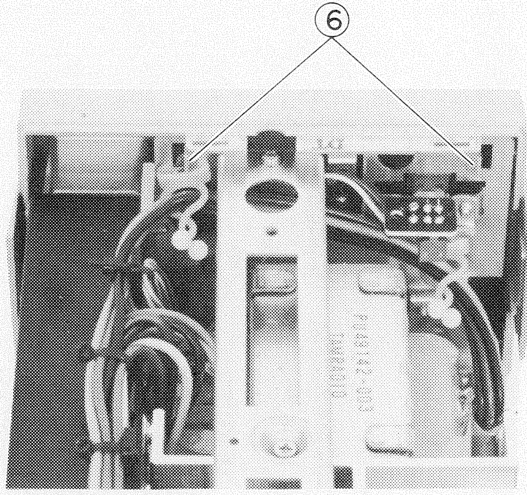


Fig. 2-3 (c)

2-2. MAIN PARTS LOCATION

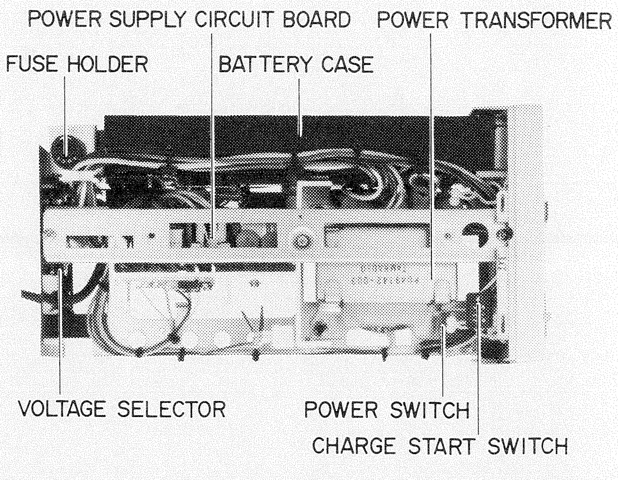

POWER SUPPLY CIRCUIT BOARD
POWER TRANSFORMER
FUSE HOLDER
BATTERY CASE
VOLTAGE SELECTOR
POWER SWITCH
CHARGE START SWITCH

Fig. 2-4

SECTION 3 ADJUSTMENTS

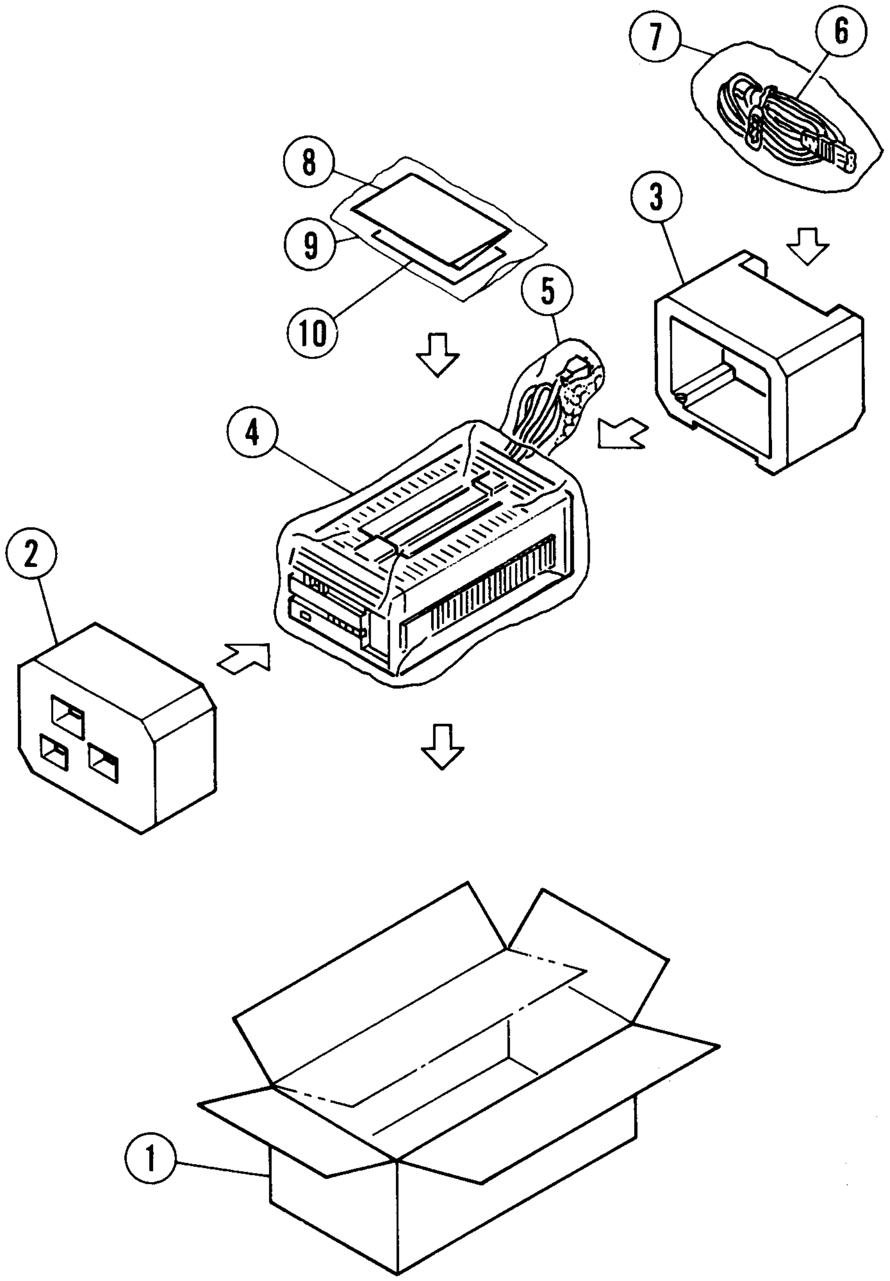
3-1. ADJUSTMENT OF 12V DC

1. Disconnect the DC power output connector from the VP-77EG/EK/S.
2. Connect a digital voltmeter or a DC voltmeter to the 6-pin terminal of the DC power output connector of terminal 63 of the power supply circuit board.
3. Adjust R12 to obtain a DC output voltage of 12.3 ± 0.2V.

3-2. CONFIRMATION OF BATTERY CHARGING VOLTAGE

1. Insert uncharged battery pack BP-N77 into VP-77EG/EK/S.
2. Turn off the POWER switch of the VP-77EG/EK/S.
3. Connect the DC power output connector to the VP-77EG/EK/S.
4. Connect a digital voltmeter or a DC voltmeter to terminal 64.
5. Turn on the POWER switch and press the CHARGE START switch.
6. Confirm that the DC output voltage is more than 16V.
7. At this time, confirm also that "BATT-1" LED of the front panel lights.
8. When the POWER switch of VP-77EG/EK/S is turned on, confirm that charging operation is not performed.
9. Confirm that the voltage at terminal 64 is 12V DC and LED extinguishes when the battery is removed from the VP-77EG/EK/S.
10. Insert the battery into the VA-77EG/EK/S and press the CHARGE START switch.
11. Confirm that the DC voltage is more than 17V at terminal 41 and the "BATT-2" LED lights.

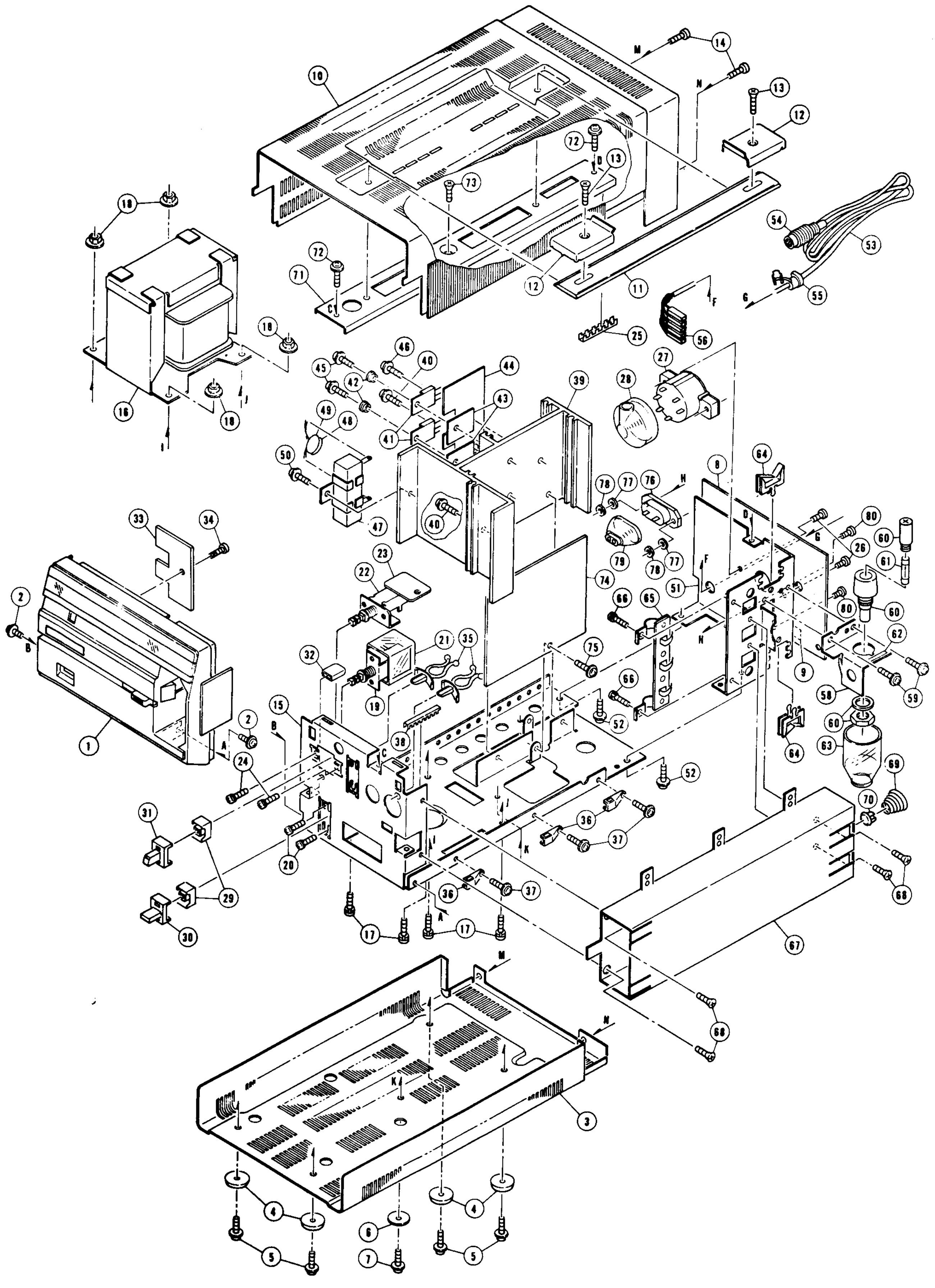
PACKING BLOCK



1. PACKING BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
1-6	EW706041	⚠ AC CORD (EG, S)
1-6	EW709819	⚠ AC CORD (EK)

CABINET & CHASSIS BLOCK

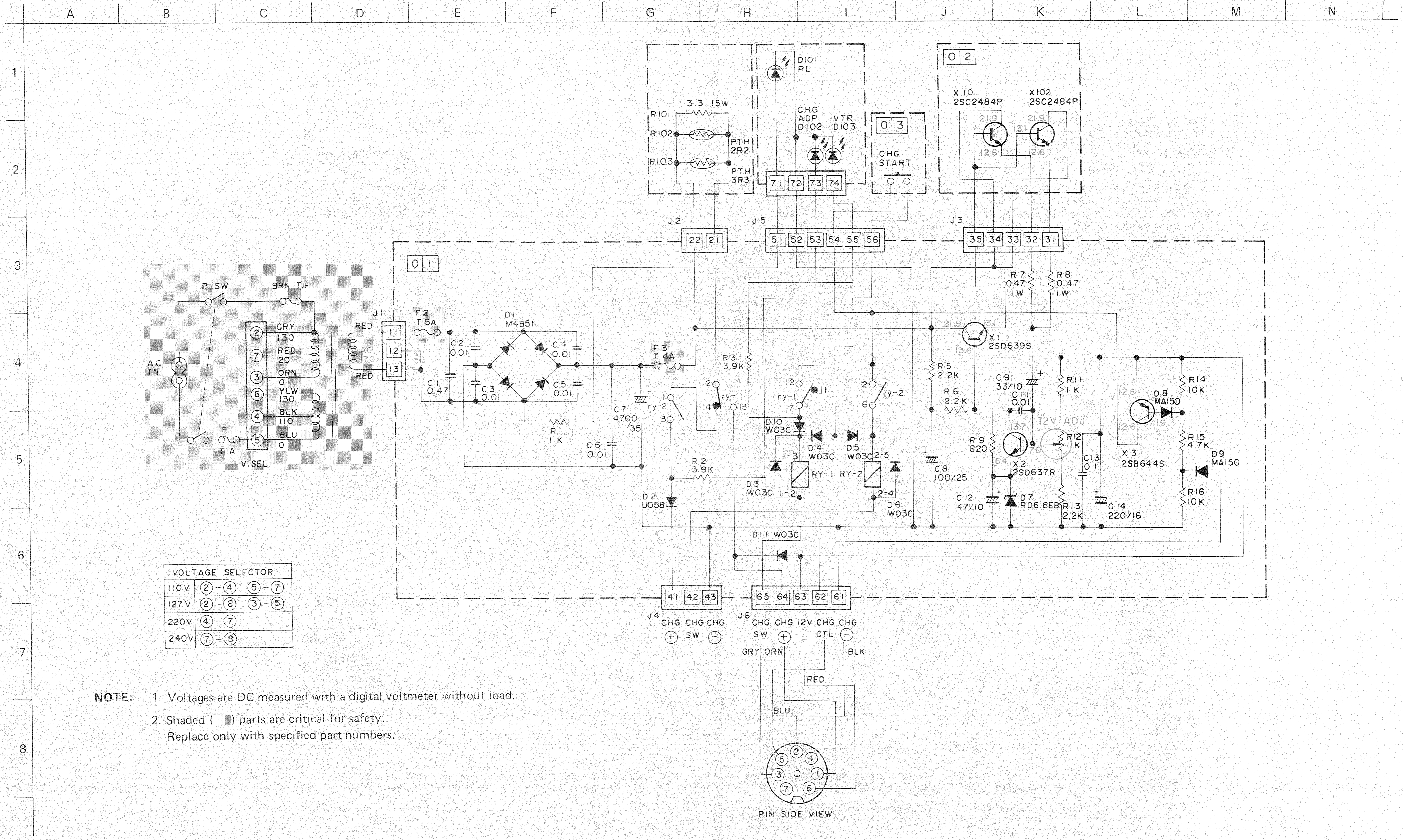

10
14
M
N
13
12
72
D
13
73
18
54
53
55
G
72
71
C
12
11
25
F
56
27
28
16
18
I
J
46
40
45
42
44
39
43
49
48
41
50
47
40
78
77
76
H
8
64
33
34
80
60
26
22
23
79
77
78
61
74
51
F
66
65
N
60
2
B
1
32
21
35
19
75
66
52
9
62
59
58
15
B
38
C
64
60
63
69
A
2
24
70
52
36
37
I
K
31
20
36
37
29
A
17
17
67
68
30
M
68
N
K
3
4
4
6
5
7
5

2. CABINET & CHASSIS BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
2-1	BD709796	FRONT COVER ASSY VA-77EG
2-1	BD709820	FRONT COVER ASSY VA-77EK
2-1	SP709822	FRONT COVER ASSY VA-77S
2-3	SP709797	BOTTOM COVER VA-77
2-4	SA709798	FOOT
2-8	SP709799	⚠ PANEL CONNECTOR VA-77EG
2-8	SP709821	⚠ PANEL CONNECTOR VA-77EK
2-8	SP709823	⚠ PANEL CONNECTOR VA-77S
2-10	SP709800	TOP COVER VA-77
2-11	VT709801	HANDLE
2-12	VT709802	HANDLE COVER
2-13	ZS238037	OSC40x16STL CMT
2-16	BT709803	⚠ TRANS POWER VA-77
2-19	ES709804	⚠ SW PUSH (POWER)
2-22	ES709805	SW PUSH (BATT CHARGE)
2-27	EJ709807	⚠ VOLTAGE SELECTOR
2-30	SB709808	PUSH BUTTON (FOR 19)
2-31	SB709809	PUSH BUTTON (FOR 22)
2-41	ET702496	TR 2SC2484P
2-47	ER709810	⚠ R CB FS 3R3 (R101)
2-48	ER709811	R CB 2R2 (R102)
2-49	ER709812	R CB 3R3 (R103)
2-53	EW709813	DC CORD VA-77 (INCL. 54)
2-54	EJ709814	PLUG 7P VA-77
2-55	EZ702852	CORD STOPPER
2-60	EJ741465	⚠ FUSE HOLDER
2-61	EF700851	⚠ FUSE T 250V 1A (F1)
2-69	ZG705605	SP
2-70	VT705606	CUP
2-76	EJ740971	⚠ AC INLET
2-83	EJ709816	TERMINAL

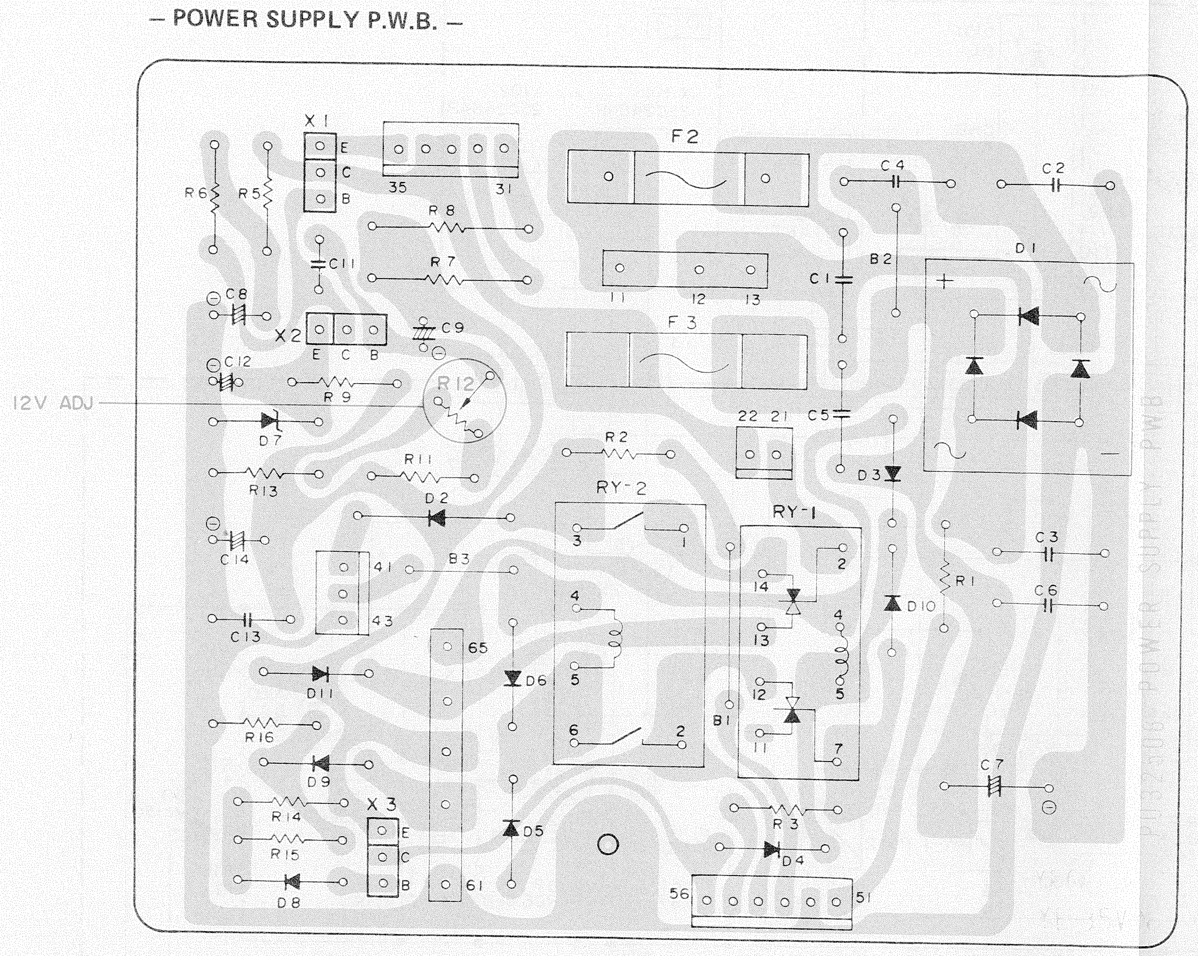
When ordering parts, please quote Parts Number, Description and Model Number.

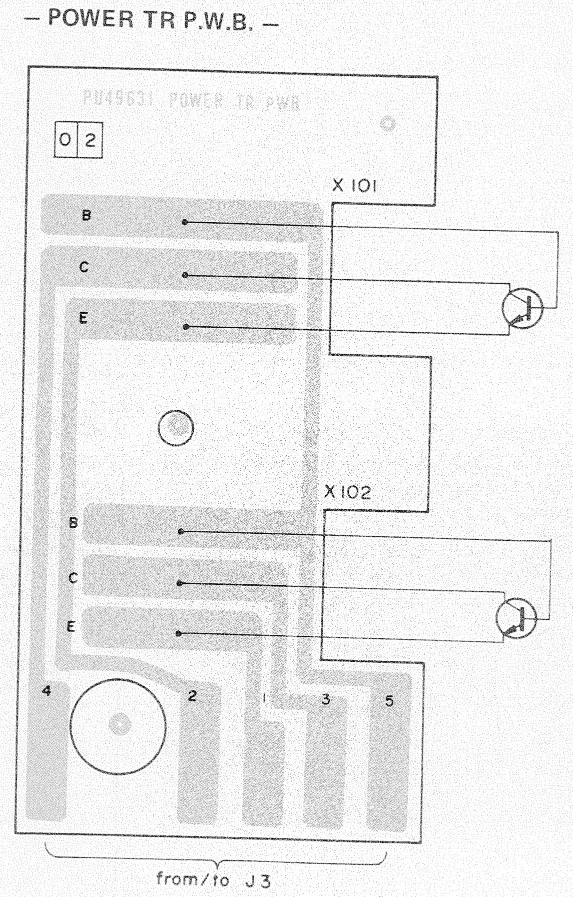
5-1. SCHEMATIC DIAGRAM (EG/EK/S)

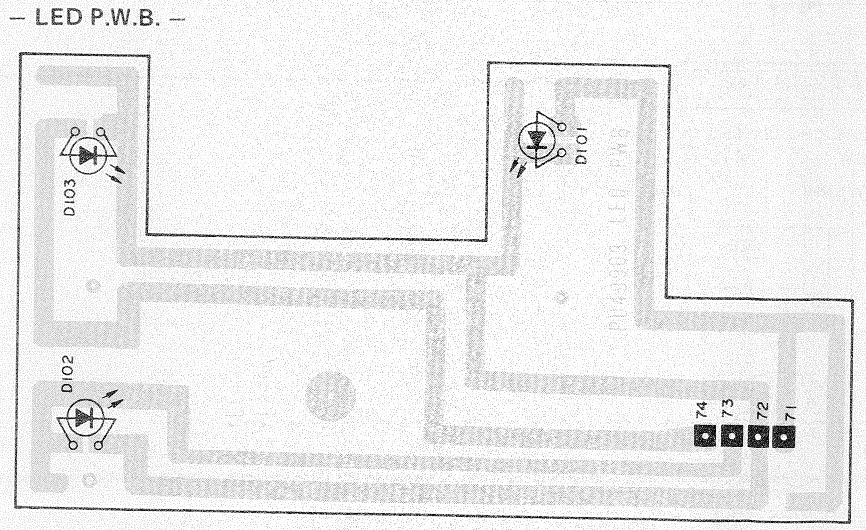

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
AC IN
P SW
BRN T.F
GRY 130
RED 20
ORN 0
YLW 130
BLK 110
BLU 0
F1 T1A
V.SEL
RED
AC 17.0
RED
J1
11
12
13
01
F2 T5A
C2 0.01
C1 0.47
D1 M4B51
C3 0.01
C4 0.01
C5 0.01
R1 1K
C6 0.01
C7 4700/35
F3 T4A
ry-2
R3 3.9K
R2 3.9K
D2 U05B
ry-1
D10 W03C
D4 W03C
D5 W03C
D3 W03C
RY-1
RY-2
D6 W03C
D11 W03C
R101
3.3 15W
R102
R103
PTH 2R2
PTH 3R3
D101 PL
CHG ADP D102
VTR D103
71 72 73 74
03
CHG START
02
X101 2SC2484P
X102 2SC2484P
21.9
21.9
13.1
12.6
12.6
J2
22 21
J5
51 52 53 54 55 56
J3
35 34 33 32 31
R7 0.47 1W
R8 0.47 1W
X1 2SD639S
13.6
R5 2.2K
R6 2.2K
C8 100/25
C9 33/10
C11 0.01
R11 1K
12V ADJ
R12 1K
R9 820
X2 2SD637R
13.7
7.0
6.4
C13 0.1
C12 47/10
D7 RD6.8EB
R13 2.2K
C14 220/16
X3 2SB644S
D8 MA150
11.9
R14 10K
R15 4.7K
D9 MA150
R16 10K
J4
41 42 43
CHG + CHG SW CHG −
J6
65 64 63 62 61
CHG SW
CHG +
12V
CHG CTL
CHG −
GRY
ORN
RED
BLU
BLK
PIN SIDE VIEW

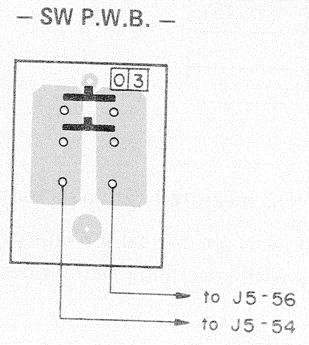
VOLTAGE SELECTOR	
110V	②-④ : ⑤-⑦
127V	②-⑧ : ③-⑤
220V	④-⑦
240V	⑦-⑧

NOTE:
1. Voltages are DC measured with a digital voltmeter without load.
2. Shaded ( ) parts are critical for safety.
   Replace only with specified part numbers.


– POWER SUPPLY P.W.B. –
X1
E
C
B
35
31
F2
C4
C2
R6
R5
R8
C11
R7
B2
D1
C1
11
12
13
F3
C8
X2
E C B
C9
C12
R9
R12
12V ADJ
D7
R2
22 21
C5
R13
R11
D3
D2
RY-2
RY-1
C14
41
B3
R1
C3
C6
43
C13
D10
65
D6
D11
B1
R16
D9
C7
R14
R3
X3
R15
D4
D5
D8
61
56
51
POWER SUPPLY PWB


– POWER TR P.W.B. –
PU49631 POWER TR PWB
02
X101
B
C
E
X102
B
C
E
4
2
1
3
5
from/to J3


– LED P.W.B. –
D103
D101
PU49903 LED PWB
D102
74
73
72
71


– SW P.W.B. –
03
to J5-56
to J5-54

SECTION 6 ELECTRICAL PARTS LIST

3. POWER SUPPLY P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
3-1	BA709833	PC POWER BLK
3-X1	ET741589	TR 2SD639S
3-X2	ET702379	TR 2SD637R
3-X3	ET709788	TR 2SB644S
3-D1	ED709789	D SILICON M4B51-12
3-D2	ED709790	D SILICON U05BF
3-D3to6	ED306163	D SILICON W03C 200/1.0A
3-D7	ED305442	D ZENER H RD6.8E B
3-D8,9	ED740729	D SILICON MA150
3-D10,11	ED306163	D SILICON W03C 200/1.0A
3-F2	EF700914	⚠ FUSE 250V 5A
3-F3	EF702882	⚠ FUSE 250V 4A
3-RY1	EP709792	RELAY
3-RY2	EP709793	RELAY
3-R7,8	ER700939	R MF 1W R47J
3-R12	EV702875	R S-FIX 102
3-C1	EC702878	C MY 474
3-C2to6	EC705280	C CE V 103P 500DC
3-C7	EC709791	C EC 472 35DC

4. LED P.C BOARD BLOCK

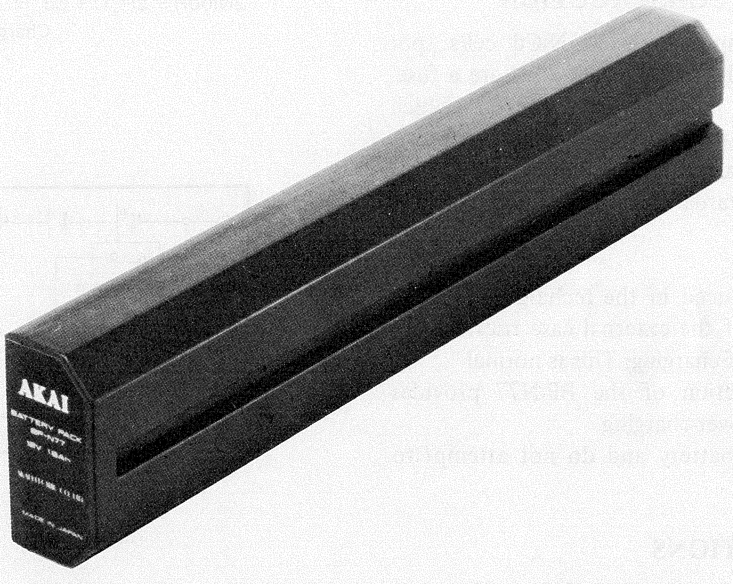
REF. NO.	PARTS NO.	DESCRIPTION
4-D101	ED709794	D LED
4-102,103	ED700006	D LED

INDEX

PARTS NO.	REF. NO.
BA709833	3-1
BD709796	2-1
BD709820	2-1
BT709803	2-16
EC702878	3-C1
EC705280	3-C2to6
EC709791	3-C7
ED305442	3-D7
ED306163	3-D10,11
ED306163	3-D3to6
ED700006	4-102,103
ED709789	3-D1
ED709790	3-D2
ED709794	4-D101
ED740729	3-D8,9
EF700851	2-61
EF700914	3-F2
EF702882	3-F3
EJ709807	2-27
EJ709814	2-54
EJ709816	2-83
EJ740971	2-76
EJ741465	2-60
EP709792	3-RY1
EP709793	3-RY2
ER700939	3-R7,8
ER709810	2-47
ER709811	2-48
ER709812	2-49
ES709804	2-19
ES709805	2-22
ET702379	3-X2
ET702496	2-41
ET709788	3-X3
ET741589	3-X1
EV702875	3-R12
EW706041	1-6
EW709813	2-53
EW709819	1-6
EZ702852	2-55
SA709798	2-4
SB709808	2-30
SB709809	2-31
SP709797	2-3
SP709799	2-8
SP709800	2-10
SP-709821	2-8
SP709822	2-1
SP709823	2-8
VT705606	2-70
VT709801	2-11
VT709802	2-12
ZG705605	2-69
ZS238037	2-13

TECHNICAL INFORMATION

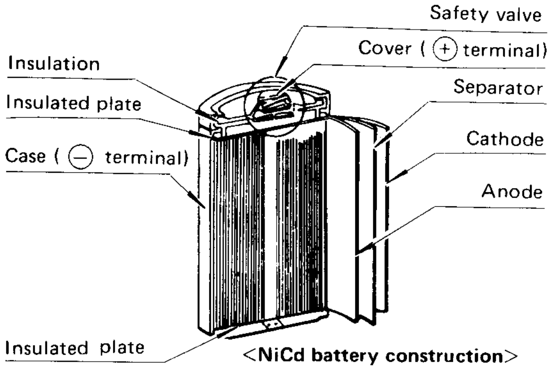
BP-N77 BATTERY PACK


AKAI
BATTERY PACK
BP-N77
9V 1.8Ah
MADE IN JAPAN

The BP-N77 is a specially fabricated nickel-cadmium (Nicd) battery pack for use with the AKAI VP-77EG/EK/S VHS portable video cassette recorder.
In comparison to a lead-acid type battery, a NiCd battery offers many advantages for use in portable video equipment. At the same time, however, certain precautions are required in order to ensure optimum performance and safety.
For this reason, please read the following description and take a few moments to instruct the customer on the proper use and handling of the BP-N77.

1. CONSTRUCTION AND PRINCIPLE

1) Fig. 1 shows the basic construction of a NiCd battery. Anode and cathode plates are spaced by a separator and wound in a spiral, then inserted into the case. After inserting the electrolyte, the case is sealed.
2) A NiCd battery uses an oxynickel hydroxide (2NiOOH) anode, a cadmium (Cd) cathode and potassium hydroxide (KOH) electrolyte. The electrochemical reaction for charging/discharging is shown in Fig. 1.



<NiCd battery construction>

$$2NiOOH + 2H_2O + Cd \underset{Charge}{\overset{Discharge}{\rightleftarrows}} 2Ni(OH)_2 + Cd(OH)_2$$

Fig. 1

2. BATTERY PACK CONSTRUCTION

The BP-N77 is composed of 10 NiCd cells spot welded with nickel plating. Also included are a fuse, a thermal fuse and a thermostat (48°C), which detects the battery temperature and controls charging. The external package is composed of heat resistant and flame retardant plastic.

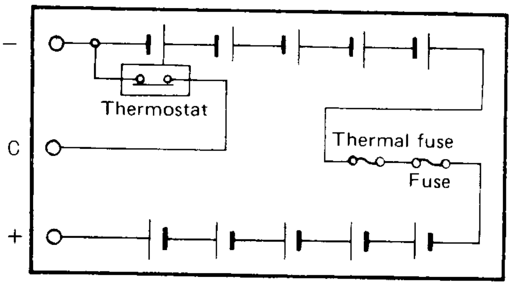


Fig. 2

NOTES:

1. Since heat is produced in the recharging process, the temperature of the external case rises shortly after completion of charging. This is normal.
2. Electrode construction of the BP-N77 provides durability against over-charging.
3. Do not open the battery and do not attempt to repair or modify it.

3. HANDLING CAUTIONS

- Be sure to charge the battery pack before using it the first time.
  Use only the VU-77EG/EK/S or VA-77EG/EK/S to perform charging and recharging.
- Do not short the battery terminals.
  A NiCd battery possesses low internal resistance and if short-circuited, the sudden large current flow poses a hazard.
  At the same time, opening of the internal fuses will render the battery useless.
- Do not expose to water or fire.
  The battery becomes nonfunctional when immersed in water. If incinerated or exposed to fire, internal gasses may cause an explosion hazard.
- Again, we emphasize: do not open the battery or attempt to modify it.

4. USAGE NOTES

The following problems are occasionally encountered when customers use the battery pack.

Complaint	Reference
1. New battery cannot be used.	Not charged before initial use The BP-N77 is not charged before shipping from the factory. Thus a new battery pack must be charged before using it.
2. Battery can be used only for a short time. It does not charge fully until after 2 or 3 charge/discharge cycles. (Excluding over-life battery.)	1. Not charged before initial use Self-discharging rate is rather high with this type of battery. For best reliability perform charging at times as close as possible prior to important taping sessions. 2. Stand-by mode operation too long When connected in a system in the E-E mode (camera and VP-77EG/EK/S electronics working, but recording not in progress), current is consumed even during the Stop and Pause modes. Thus, if stand-by is used extensively, the actual recording time becomes shortened. Example: The combination of VP-77EG/EK+VC-31EG/EK, (or VC-61EG/EK) can be operated for about 60 minutes per charge. However, if there is a 2:1 ratio between the time for setting the camera angle and recording, only about 20 minutes becomes left for actual recording. 3. Camera power consumption high The power consumption of the camera (and electronic viewfinder, if used) strongly influences the recording time. Some examples of equipment combinations and approximate continuous recording times are follows. VP-77EG/EK + VC-31EG/EK, (or VC-61EG/EK) . . . 60 minutes 4. Charging under high temperature The discharge time (useful operating time) becomes appreciably shortened when the battery is charged in the presence of temperatures above 35°C (95°F). Therefore, for best results, perform charging in a temperature range of 10°C to 35°C (50°F to 95°F). One effect of charging at high temperature is temporary reduction of charging capacity. However, when returned to normal temperature, the original charge/discharge response is also returned. Nevertheless, continuous operation at high temperature will deteriorate the battery. 5. Long storage periods In a multicell battery pack, there are unavoidable differences in the self-discharge rates of the individual cells. After long storage in a charged state, a low-charged cell can reverse polarity when the battery is used. In this event, 2 or 3 cycles of charge/discharge are required to return to normal storage capacity. Example: After 3 months storage, a battery may be able to hold only 70% of capacity with one charging. In this case, the typical 60 minutes of operation becomes reduced to about 40 minutes.
3. Battery heats up directly after charging.	This is normal due to the temperature detection type of charging system. However, it is advised not to place the battery in an insulated type of case (such as styrofoam) immediately after charging. Allow sufficient time for the internal heat to dissipate.

REFERENCE DATA

1. CHARGING RESPONSE (CHARGING TIME VS. TEMPERATURE)

1) Perform charging in a temperature range of 10°C to 35°C (50°F to 95°F). Below 10°C (50°F), there is risk of over-charging and battery deterioration.
2) When used according to instructions, recharging time with the VA-77EG/EK/S is about 90 minutes.

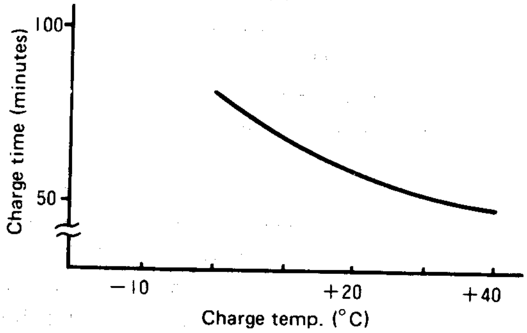


Fig. 3

2. DISCHARGE RESPONSE (TIME VS. TEMPERATURE)

1) Use battery in a temperature range of −10°C to 40°C (+14F to +104°F).
2) Fig. 4 shows the discharge curve when the BP-N77 is charged at 25°C (77°F) and used with the VP-77EG/EK + VC-31EG/EK (or VC-61EG/EK) combination.
3) Discharge time also varies according to the connected camera. In addition, the time becomes shortened at low temperatures.

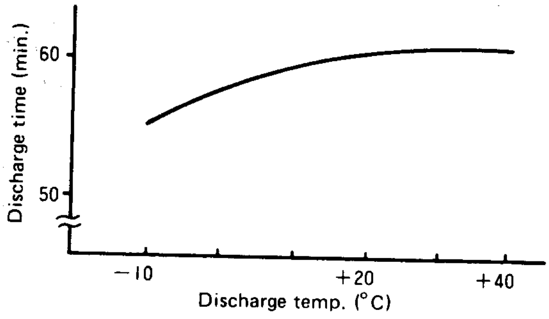


Fig. 4

3. DISCHARGE TIME VS. CHARGING TEMPERATURE

1) Discharging time of a NiCd battery is strongly governed by the temperature at the time of charging. At high temperatures, oxygen gas is liberated more quickly and limits the effective charging capacity.
2) The Fig. 5 curve shows the discharge (continuous operating) time versus charging temperature for the combination of BP-N77 and VP-77EG/EK + VC-31EG/EK (or VC-61EG/EK).

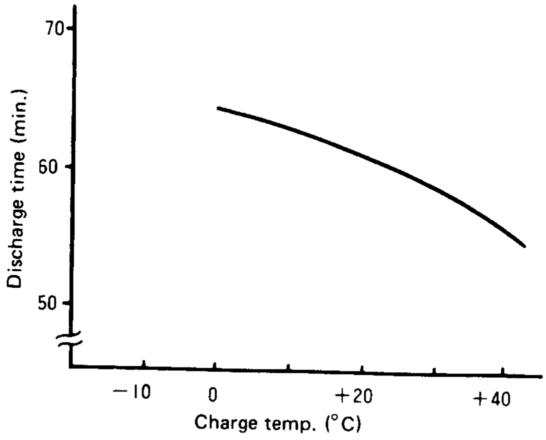


Fig. 5

4. CONTINUOUS OPERATION

An example of the discharge current versus the discharge time is shown in Fig. 6. In the case of the VP-77EG/EK + VC-31EG/EK (or VC-61EG/EK) combination, this becomes about 60 minutes.

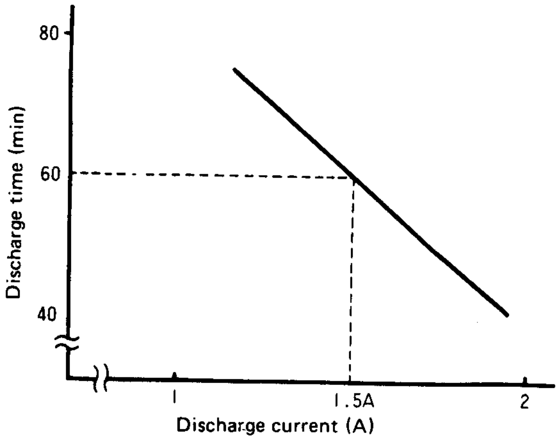


Fig. 6

5. STORAGE TEMPERATURE VS. DISCHARGE

1) Use the battery to discharge it before storing for an extended period of time. When the battery is stored in the discharged state, its charge/discharge characteristics tend to return to normal more quickly than one stored in a charged state.
2) Store the battery pack in a dry location with a temperature range of −10°C to +30°C (+14°F to +86°F).
3) Note that the self-discharging characteristics of a NiCd battery are somewhat less favorable than those of a lead-acid battery.
4) After long storage, 2 or 3 charge/discharge cycles are required to return to normal storage capacity.

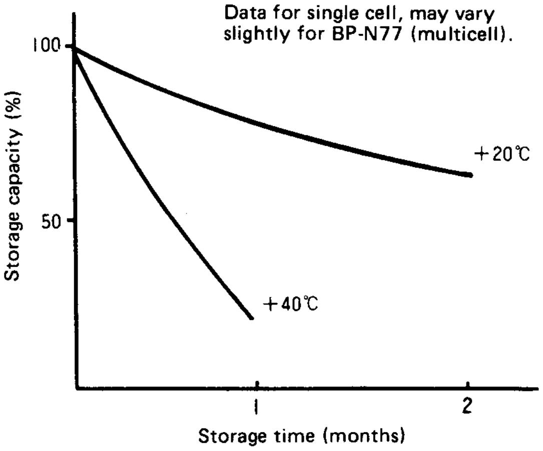


Fig. 7

6. LIFE (CHARGE/DISCHARGE CYCLES)

1) Battery life is strongly influenced by conditions of use (ambient temperature, discharge depth, usage frequency, etc.)
2) When used according to instructions under normal conditions, a life of over 300 to 500 cycles can be expected.

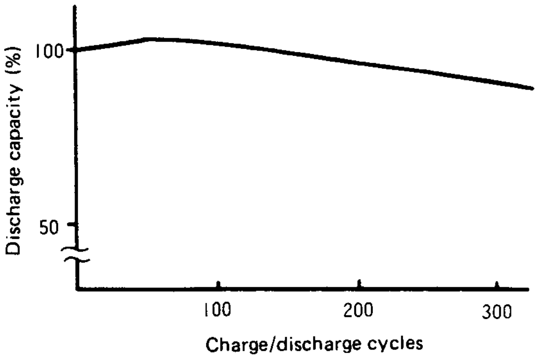


Fig. 8